SEPTEMBER 20, 1954

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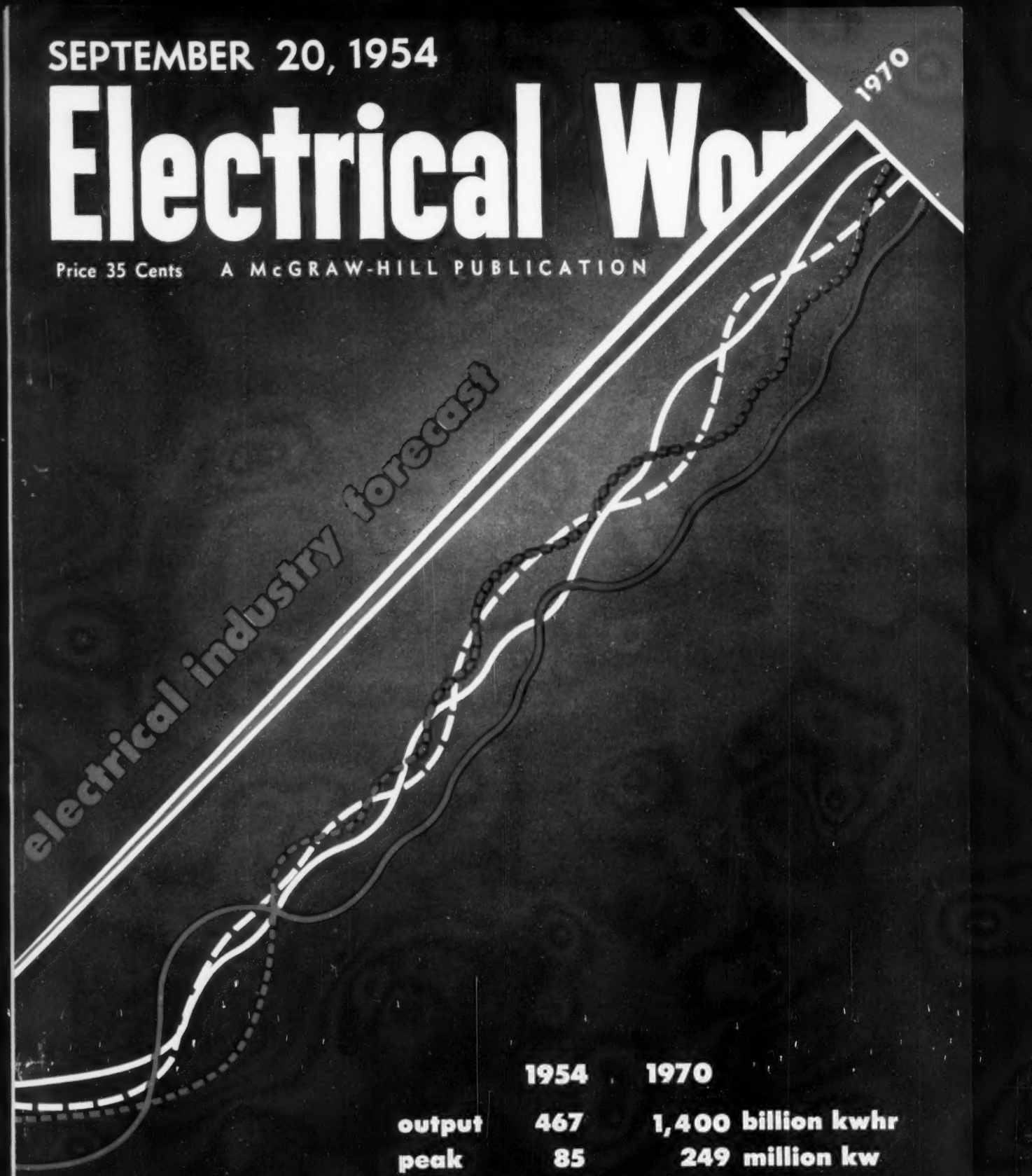
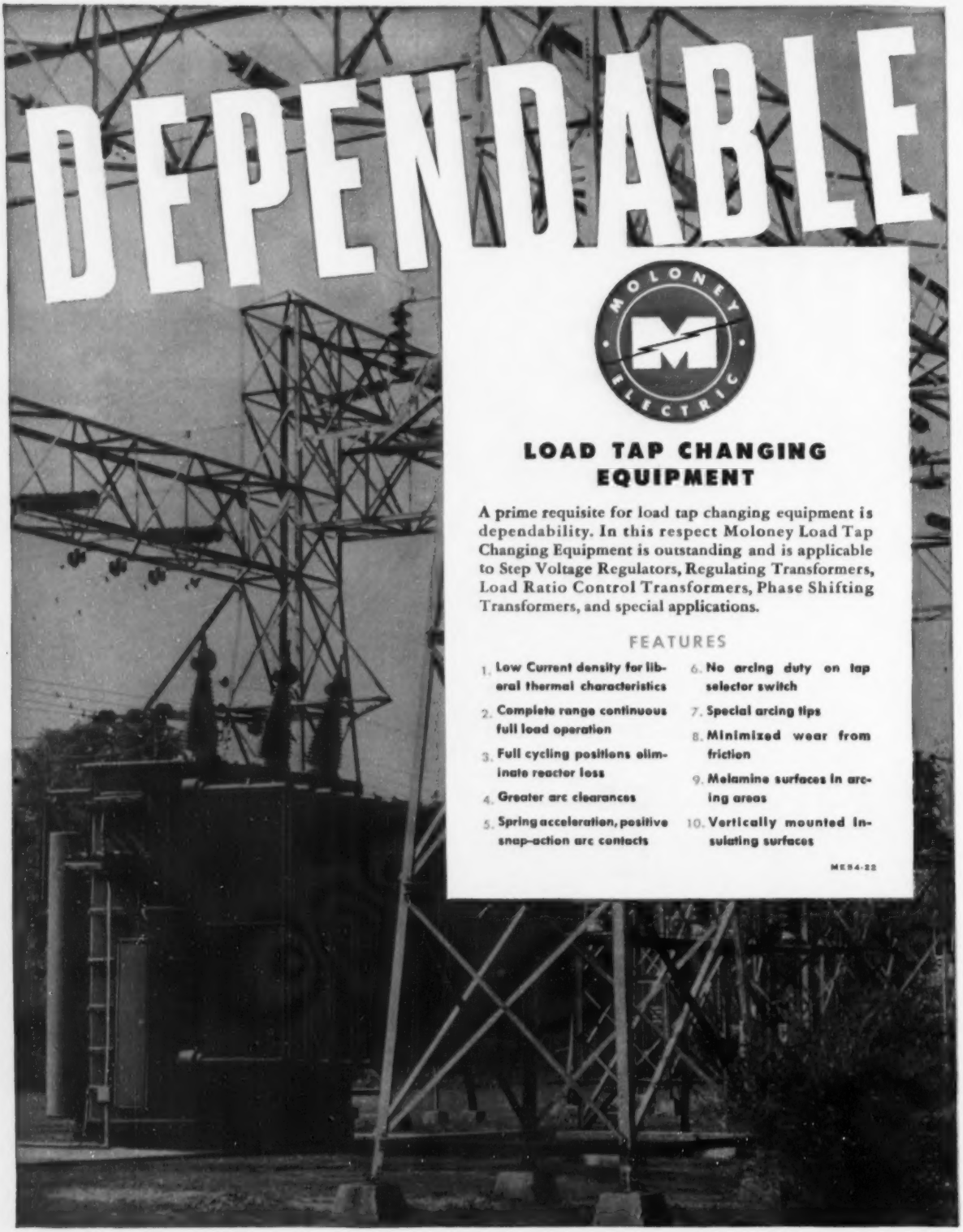


	1954	1970
output	467	1,400 billion kwhr
peak	85	249 million kw
capability	103	304 million kw

for other significant data turn to page 119



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Vol. 142 No. 12 September 20, 1954

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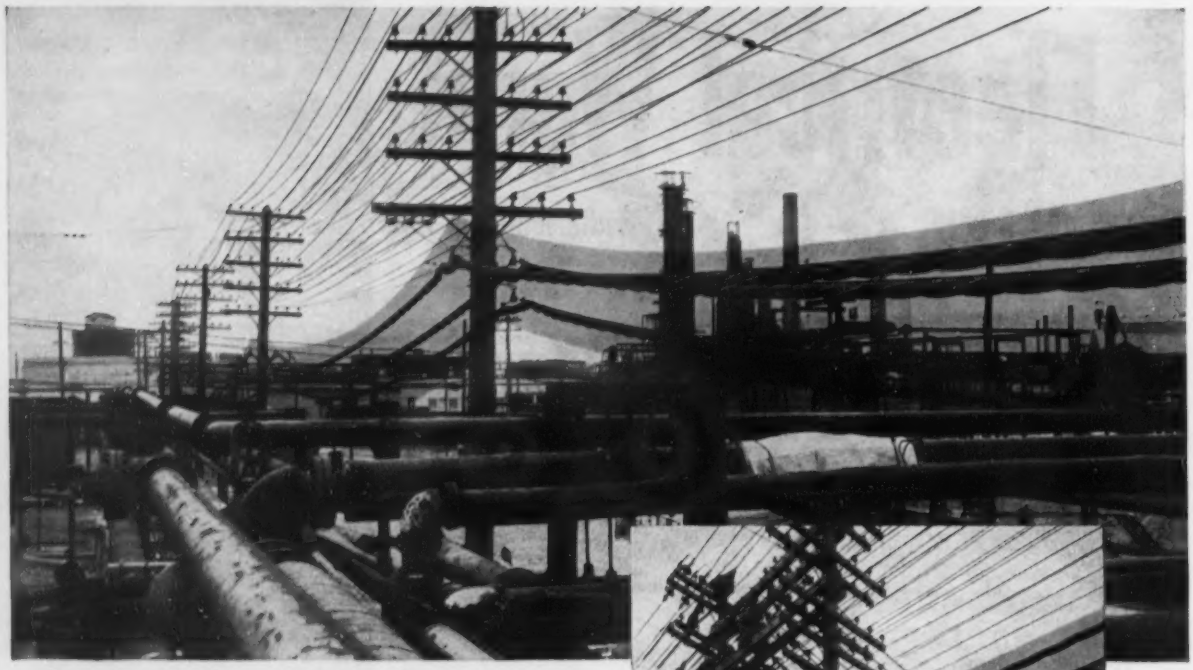

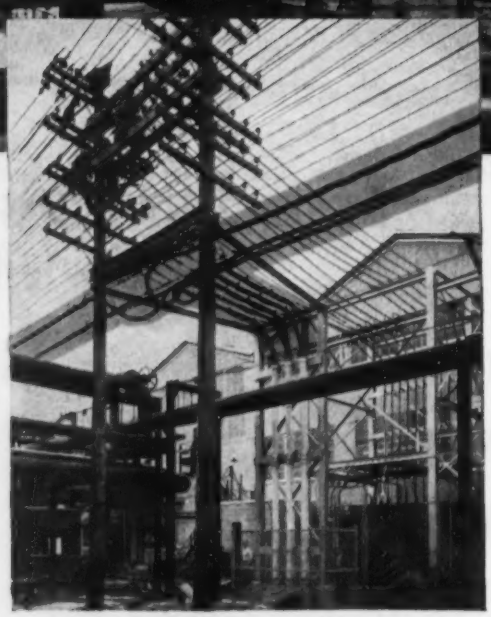

1. New Okolite-Okoprene 13.2 kv self-supporting aerial cables take little space on heavily crowded poles at the Gulf Oil Corporation's Philadelphia Refinery.
2. Primary distribution circuits in conduit leaving substation and rising in conduit to poles.

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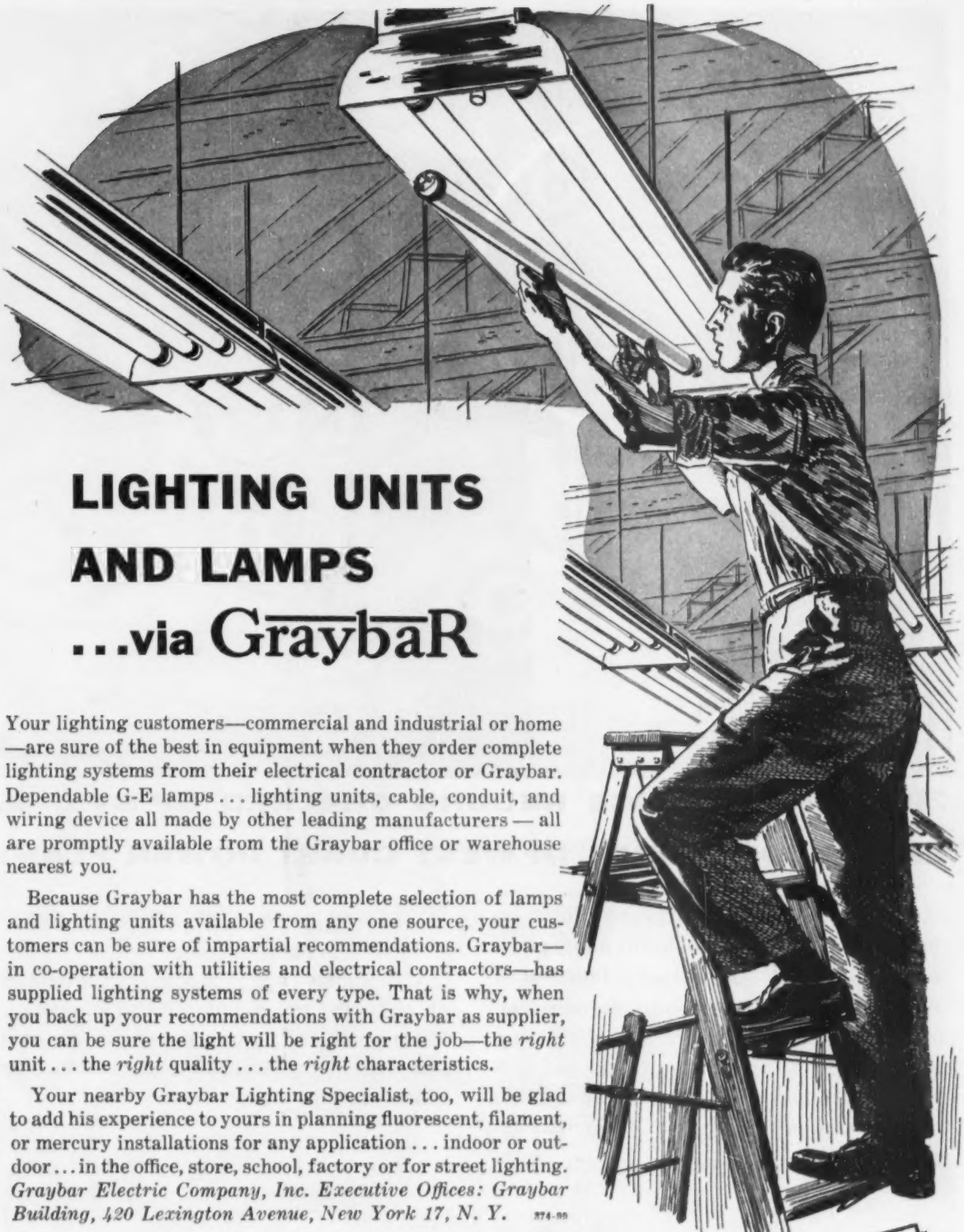

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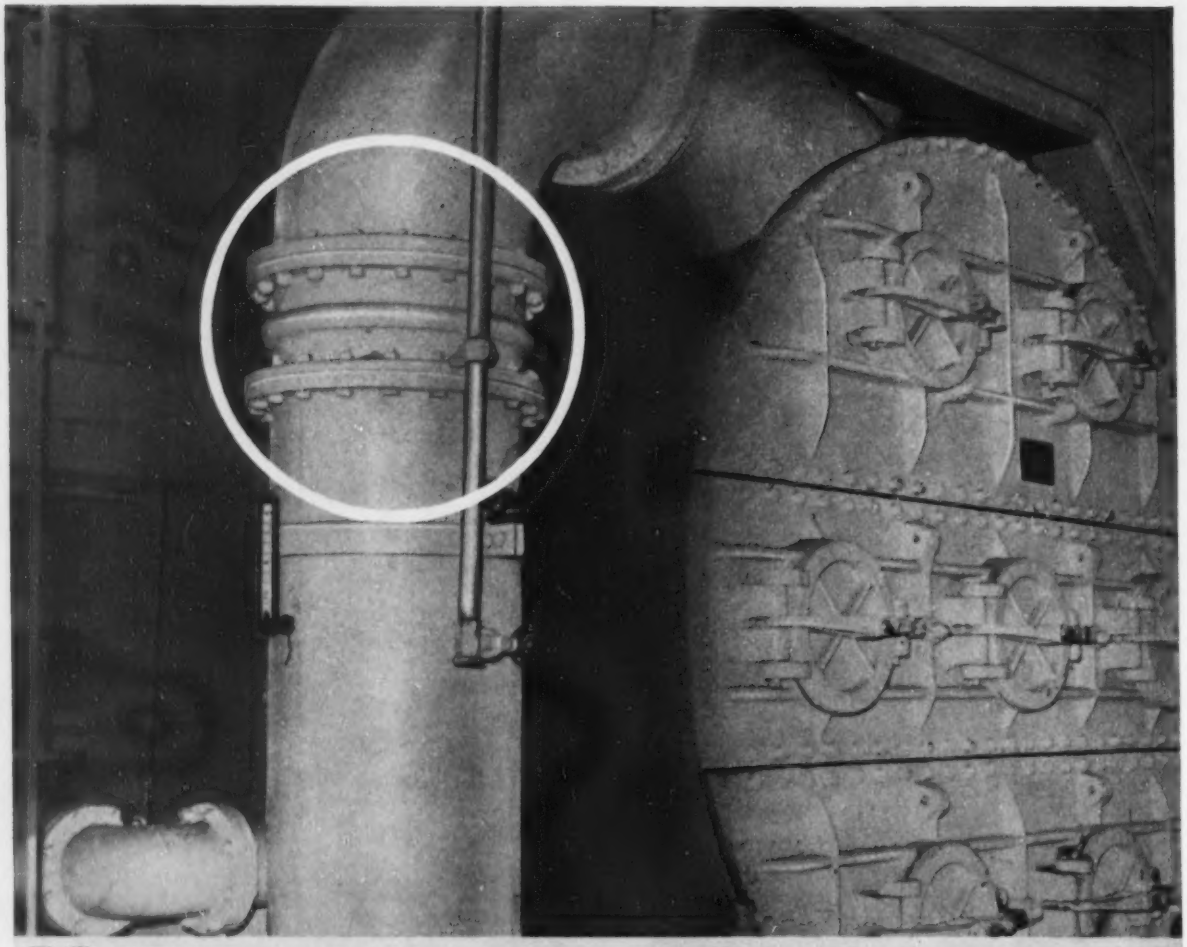

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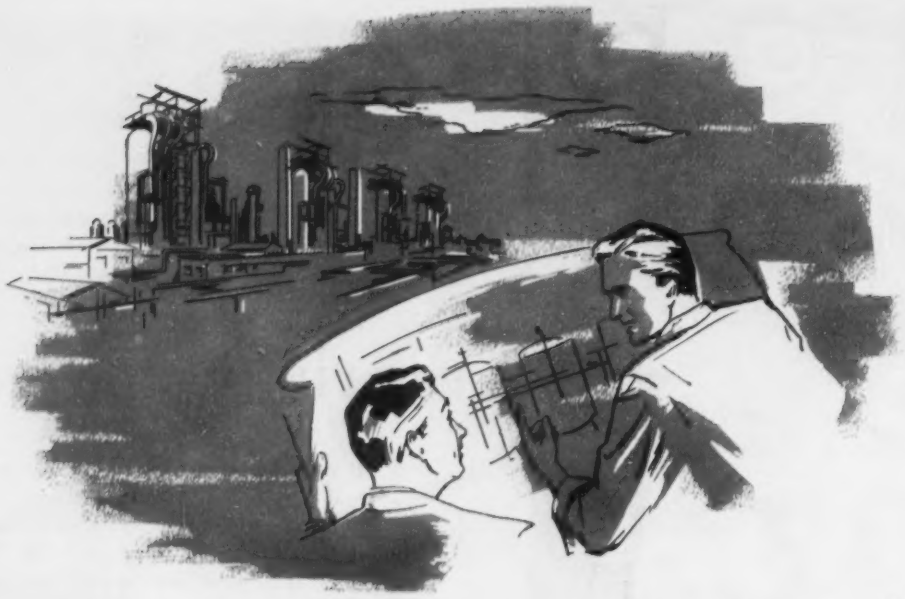

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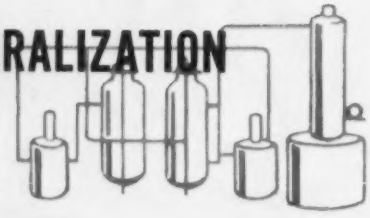

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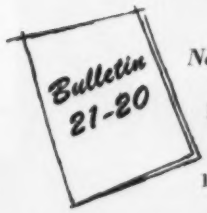

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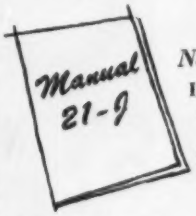

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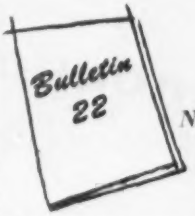

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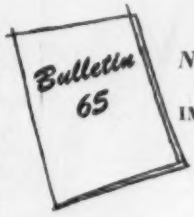

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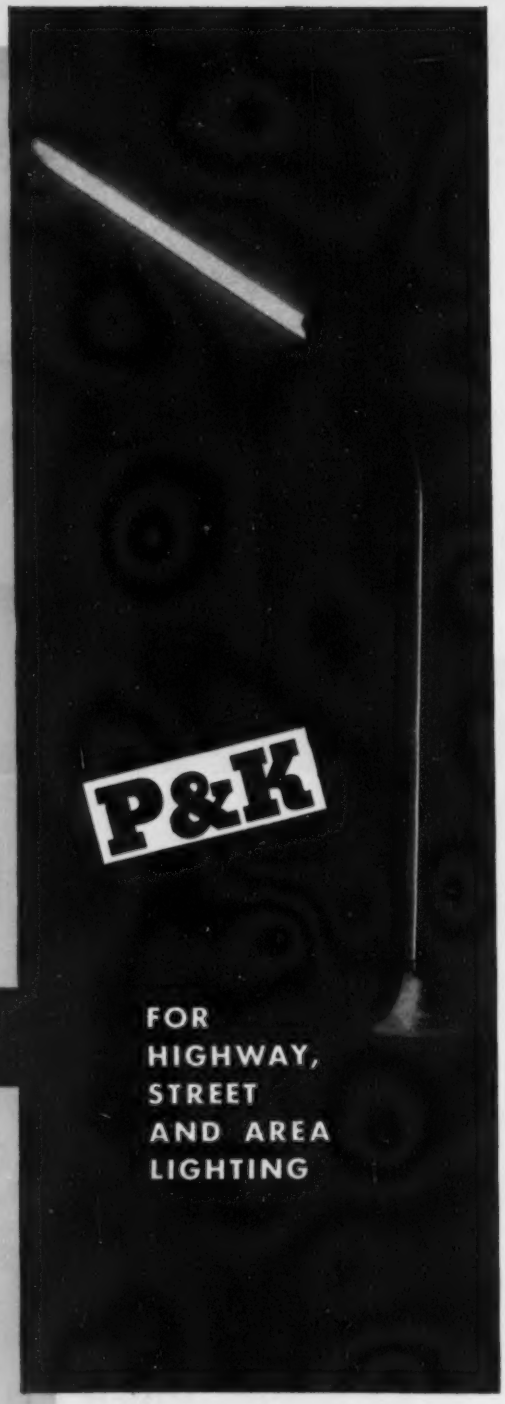

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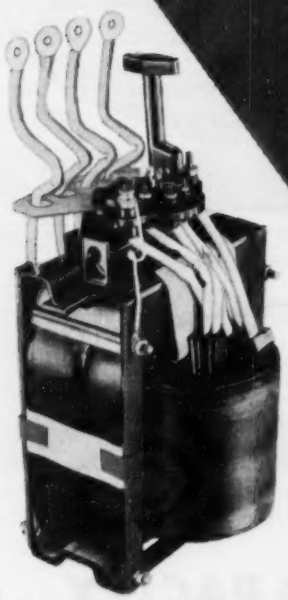

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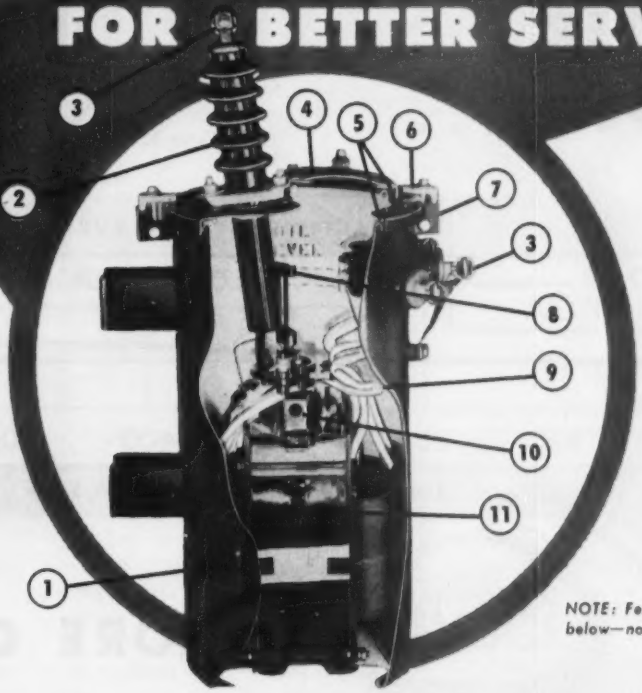

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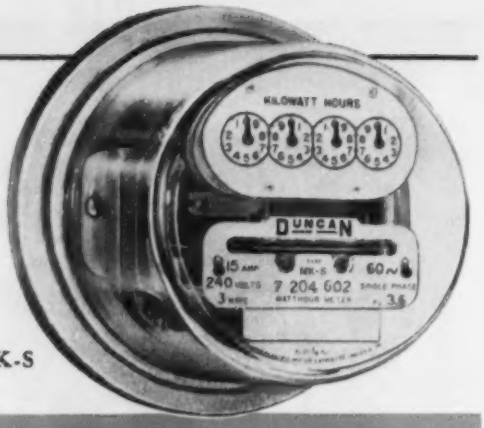

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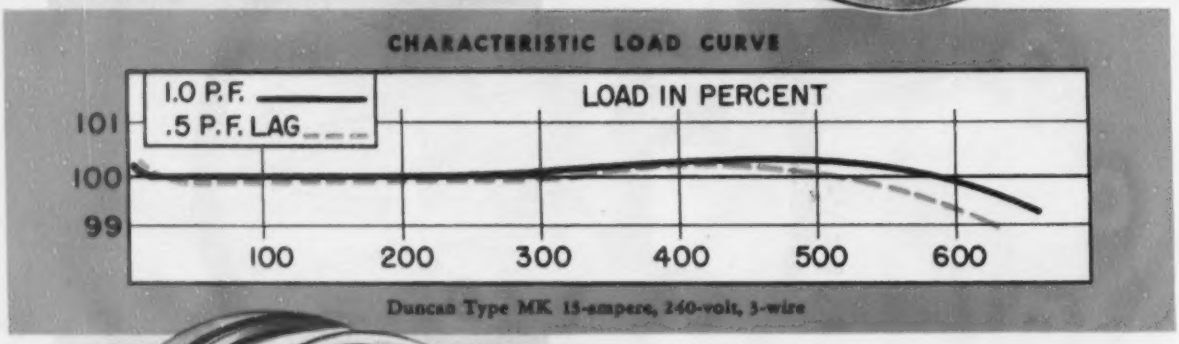
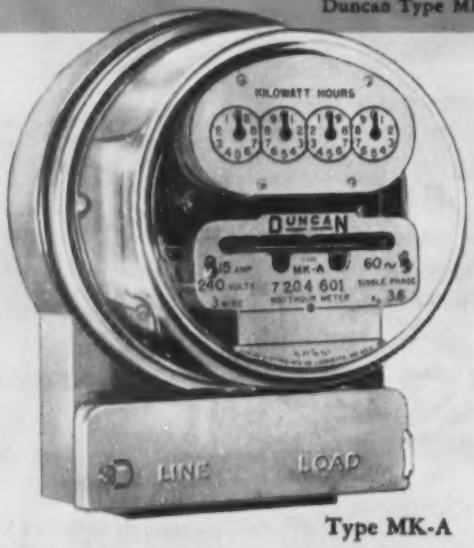


Duncan Type MK 15-ampere, 240-volt, 3-wire



Type MK-A

MORE CAPACITY PER DOLLAR

● Duncan Electric Mfg. Co., pioneer* in "extended range" metering, now offers the Type MK singlephase meter—a completely new design with increased capacity to keep ahead of the expanding use of electric energy. The general purpose Type MK meter, nominally rated at 15 amperes, has "extended range" capacity to meter continuous loads to 100 amperes—light load performance remains the same—no increase in price.

Growth in the Electrical Industry is well known —residential consumption doubling every 8 to 10 years. Numerous field tests have shown the present 15-ampere 3-wire general purpose meter (top capacity of 60-amperes) is now on the average less than half loaded. However, with the present *average* load running in the middle of the capacity range, more and more residential loads are pushing through the 60-ampere ceiling. Today's requirement for a sound investment, therefore, seems to be for *one meter* suitable for existing loads (minimum, average, and up to 100-amperes) and for loads of the future.

Extended Range Developments Pioneered by Duncan

1930—Type MD—15-ampere singlephase range extended to 60-amperes.

1949—Type MF—50-ampere singlephase socket meters with "extended range" capacity to 200-amperes.

1949—HD Device—mounting device with 200-ampere capacity for use on singlephase or polyphase.

1951—Type MH—50-ampere polyphase socket meters with "extended range" capacity to 200-amperes.

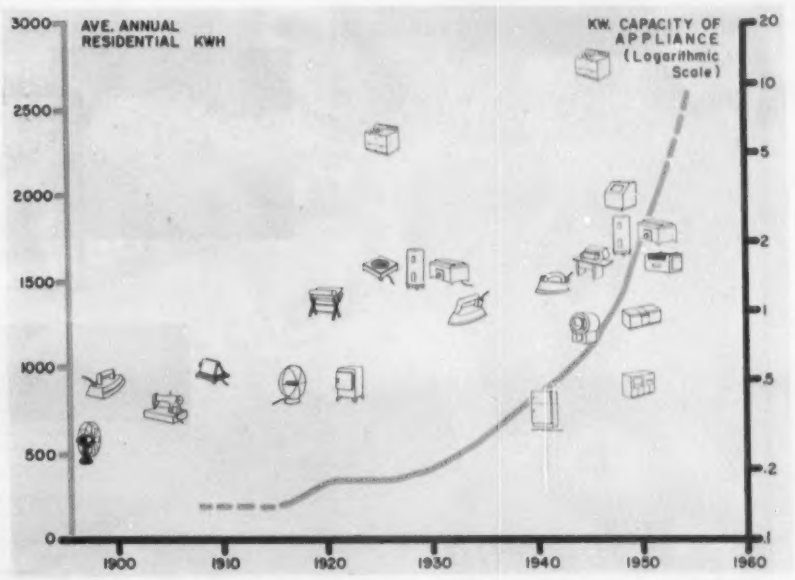
1954—Type MK—15-ampere singlephase with "extended range" capacity to 100-amperes.

More Kva of Capacity to handle greater loads, without sacrificing performance at lighter loads, is the purpose of the new Duncan Type MK singlephase meter. This, *without an increase in basic price, means more metering capacity per dollar* capital investment.

FEATURES

The maximum temperature rise of the current coil is approximately 50°C with a load of 100 amperes when installed in a standard pan type socket, such as the Duncan Type C—#2 copper conductors. The temperature rise at the socket jaws, under these conditions, is only 40°C. A factor in obtaining the capacity of the current coil circuit is the elimination of all mechanically clamped or bolted joints.

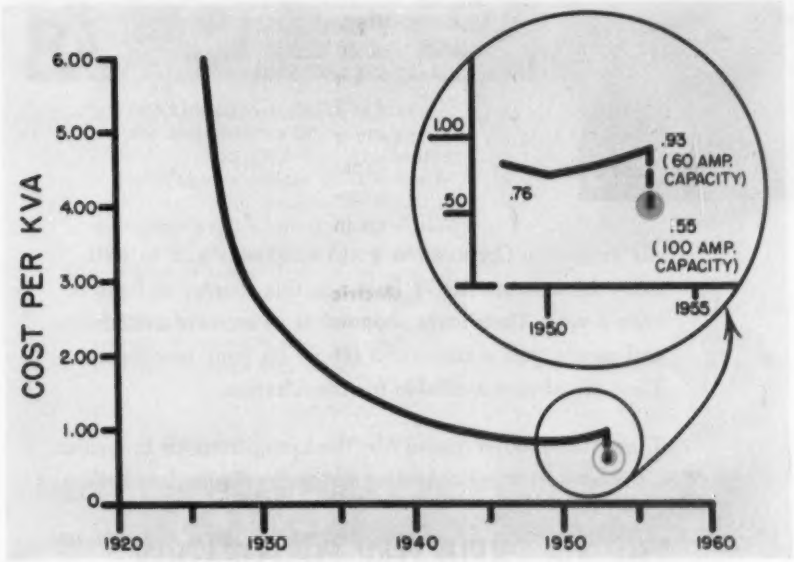
Arc Gaps, Plus Improved Insulation, protect the meter against lightning discharges. The gaps are adjusted to flash over at approximately 4,500 volts r.m.s. (6.5 KV 1½ x 40 micro sec. impulse) which is approximately 50% of the insulation level of the electromagnet. Both current and potential coils are molded in high temperature polyvinyl chloride.



RESIDENTIAL LOAD GROWTH AND APPLIANCE DEMANDS

The Basic Watthour Constant of .6 was selected to facilitate widening the load range and to aid in standardization of constants. The new 15-ampere MK, operating near maximum capacity—100 amperes—will still have a disc speed approximately 10% lower than the superseded Type MF at its maximum capacity of 60 amperes.

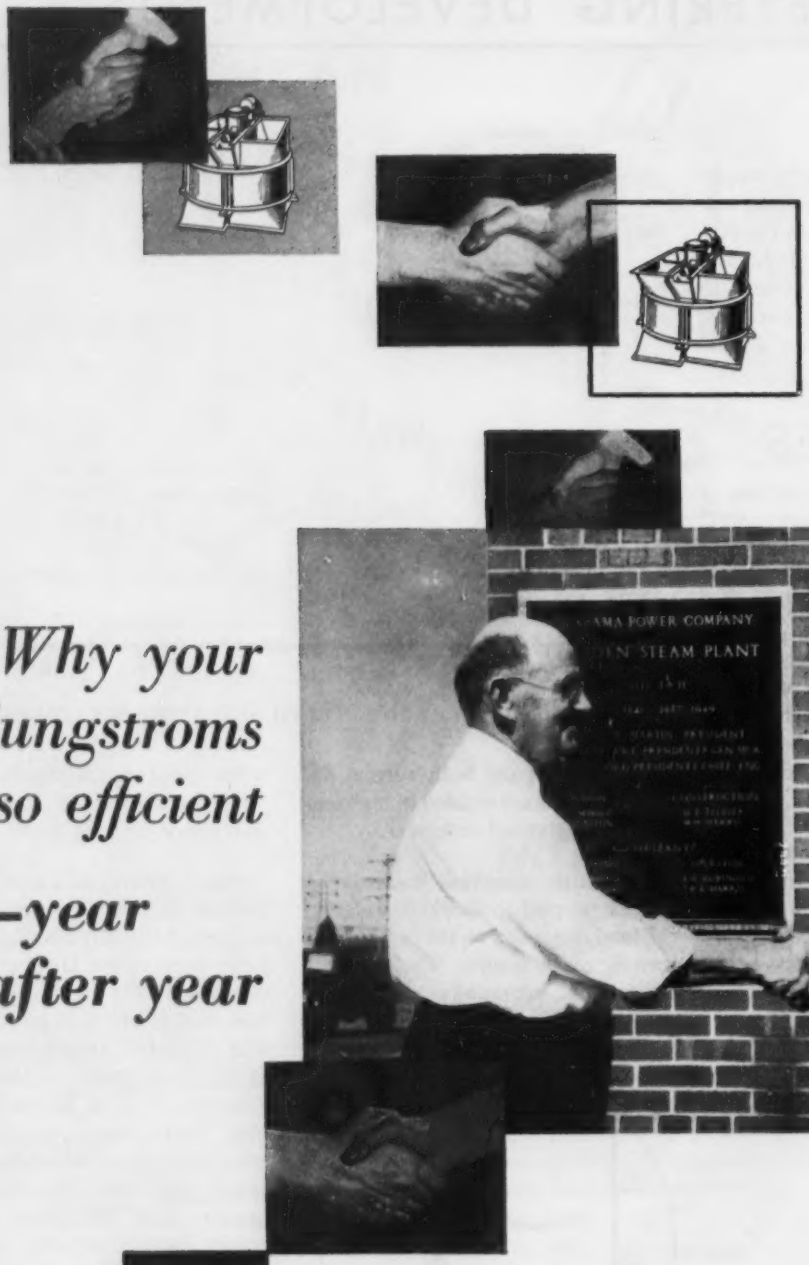
Many Features Continue in the Duncan MK design: *Alnico damping magnet*—originally introduced in watthour meters by Duncan—resists changes due to lightning discharges (less than ¼ of 1% calibration change with discharge current even in excess of 50,000 amperes); top bearing is a K-monel pin with a carbon graphite ring; lower bearing is time proven jewel and ball combination; *no mechanical adjustments*—bearings tighten against fixed shoulders to insure proper location of disc, and worm wheel is fastened to frame to insure proper mesh; convenient register reset; *microset adjustments*—all accessible from the front and operated with a standard screwdriver.



AVERAGE METER COST PER KVA
Based on usage of 5 and 15-ampere meters.

DUNCAN ELECTRIC MFG. CO.
Lafayette Indiana

(Advertisement)



Why your Ljungstroms are so efficient

—year after year

Air Preheater Corporation Field Engineers aim to visit every Ljungstrom Air Preheater in this country at least once a year. Their main objective is to increase availability and assure you a maximum return on your investment. They are always available for consultation.

This is just another reason why the Ljungstrom Air Preheater *is the most economical heating surface on the modern boiler.*

THE AIR PREHEATER CORPORATION

60 East 42nd Street
New York 17, N. Y.

NOW

you can operate small valves economically & safely

with Limitorque® REMOTE CONTROL

The new SMA-00 and SMA-000 LimiTorque Valve Control is the latest and most advanced method of operating small valves, ranging from 1½" up to 8" in diameter. These units provide complete safety to workmen, by eliminating the need of climbing to high or hazardous locations for manual valve operation. The valve operating parts are protected by two limit switches ...One provides uniform valve seating thrust, giving positive protection to the parts from overload. The second switch is the geared limit, which controls the stem travel for both directions.

SMA-00 and SMA-000 LimiTorque Valve Controls offer an extremely economical, and simple method of motorizing smaller valves. These Operators can be readily applied to all types of Valves: Gate, Globe, Plug and Butterfly . . . and may be had to actuate by a wide range of power sources including Electricity, Hydraulic Pressure, Natural Gas or Air.

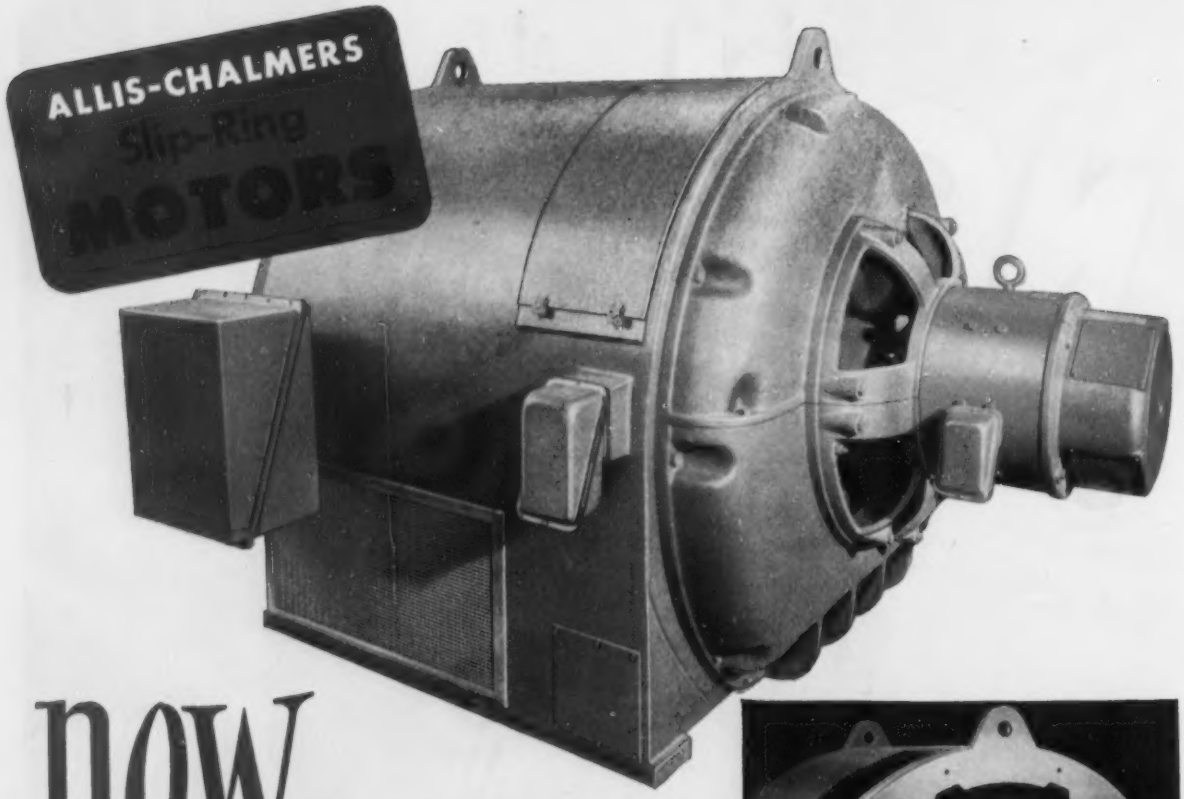
For full details and information regarding these new LimiTorque Valve Controls, write for latest Bulletin.

PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

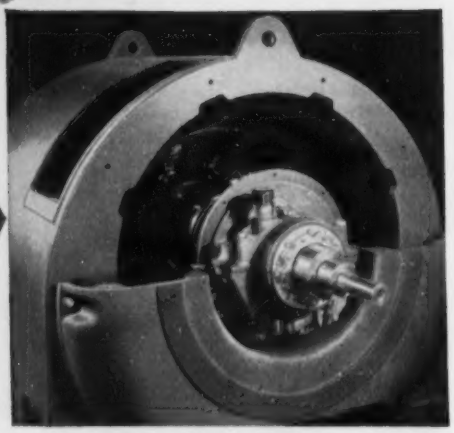
Industrial Gears & Speed Reducers

LimiTorque Valve Controls



new DESIGN...

more protection with full accessibility



* New Allis-Chalmers slip-ring motor with inspection cover and upper half of end shield removed. Note accessibility of brushes, protection of bearing.

ALLIS-CHALMERS LARGE SIZE SYNCHRONOUS AND WOUND-ROTOR MOTORS have been completely redesigned with longer stator yokes and shorter end shields. Collectors and brushes are located inside the yoke for protection against physical damage, dripping moisture, dust and dirt.

Capsule-type bearings give better bearing protection, too. The upper half of the end shield may be removed for inspection or cleaning of the interior of the motor without disturbing the exciter or exposing the bearing to the ravages of dirt, dust and oil contamination.

All leads enclosed — Both primary and secondary winding leads are brought out through separate conduit boxes. There is no loose wiring . . . no exposed leads anywhere.

Easy maintenance — Even though the new design offers maximum protection to brushes and collectors, internal parts are fully accessible for inspection and maintenance through large openings in the stator yoke. Opening covers are readily removed and are secured during operation by easy-operating, self-locking fasteners.

Get details now — This new design is available from approximately 250 hp at 300 rpm and up, in drip-proof and splash-proof construction. Call your Allis-Chalmers representative for complete details or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 05R8183. A-4464

ALLIS-CHALMERS

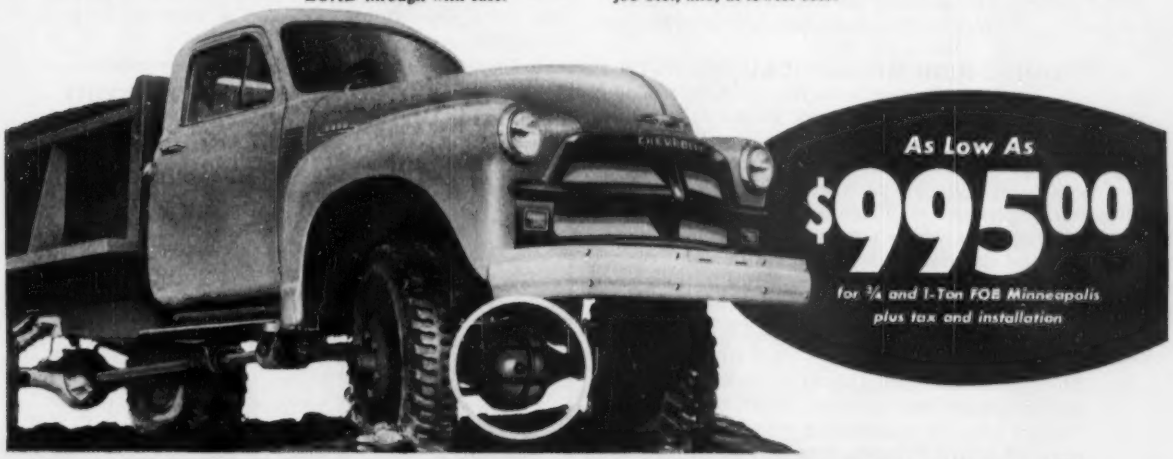
Lowest Priced 4-Wheel Drive In Its Field!

GEOPHYSICAL & FORESTRY WORK...
You can't beat this Chevrolet panel truck with NAPCO 4-wheel drive for getting work crews with tools and equipment to tough "off the road" job sites.

ROAD AND BUILDING CONSTRUCTION...
Whether it's a tough pull out of a gravel pit or at time-saving speed over the highway, your Chevrolet Truck equipped with NAPCO 4-wheel drive gets you PLUS A FULL LOAD through with ease.

FOR SERVICE STATIONS...
Here's the most versatile vehicle you've ever driven. Whether it's towing a big bus, "chasing parts", or plowing snow, your Chevrolet 4-wheel drive "pick-up" does the job best, and, at lowest cost!

FOR UTILITY COMPANIES...
When you have to get men and equipment through to tough "off the road" jobs, your Chevrolet truck equipped with NAPCO 4-wheel drive is the answer.



NAPCO 4-WHEEL DRIVE for CHEVROLET TRUCKS

3/4, 1, 1½ and 2 TON

Check These Exclusive Advantages:

● UTILIZES STANDARD REPLACEMENT PARTS
Parts and service for NAPCO Powr Pak are available at any Chevrolet dealer from coast to coast. All replacement parts for the entire differential of the front axle assembly are available at any Chevrolet Dealer.

● COMPLETELY PROVEN
Repeat orders from the nation's largest utility companies and fleet owners are proof that NAPCO 4-Wheel drive is doing an outstanding job.

● STANDARDIZES YOUR FLEET
NAPCO 4-wheel drive is installed without cutting, welding or altering cab or frame. It is bolted to the frame and can be removed at will. It is simple to transfer it from a worn truck to a new one.

● EASY HANDLING
The normal easy turning and handling characteristics of Chevrolet trucks are not affected by the NAPCO Powr Pak installation. At cruising speeds over highways there's no trace of whip or weave... no fighting the wheel. And, when the going gets tough "off the road", just a flip of a lever gives you finger tip control of tremendous extra traction power ... no stopping or declutching necessary to shift.

Now, for hundreds of dollars less than any other 4-wheel drive in its field, you can buy the famous NAPCO Powr Pak for Chevrolet ¾, 1-ton, 1½ and 2-ton trucks.

A 4-WHEEL DRIVE "PICK UP"

Now, for the first time you can have a Chevrolet "pick-up" with 4-wheel drive for the extra traction power to "go anywhere". Chevrolet trucks equipped with NAPCO Powr Pak get you in and out of jobs no matter how tough the going is. And, you get more than just transportation . . . you get a truck that takes you PLUS a full load through the toughest off-the-road terrain with ease. Then when you get out onto the highway, you have ease of handling at cruising seeds. No costly "down time" when operating Chevrolet trucks equipped with NAPCO 4-WHEEL DRIVE!

DEMONSTRATIONS ON REQUEST

You owe it to yourself to see how much a Chevrolet truck with NAPCO 4-Wheel drive can do for you. We'll be happy to arrange a demonstration. Just send this coupon and DO IT RIGHT NOW WHILE YOU'RE THINKING ABOUT IT!

SEE YOUR LOCAL CHEVROLET DEALER OR MAIL THIS COUPON TODAY!

NAPCO POWR-PAK 4 WHEEL DRIVE

NAPCO PRODUCTS DIVISION
NORTHWESTERN AUTO PARTS CO.
834 N. 7th St. • Minneapolis, Minn.

☐ I would like a demonstration.
☐ I would like a brochure with specifications and complete details.

Name _____
Company _____
Address _____
City _____ State _____

You can simplify purchasing . . . improve design . . . speed production

with improved C-D-F DILECTO® laminates

Only C-D-F, the Continental-Diamond Fibre Company, makes Dilecto laminated plastic, just as only Cadillac makes a Cadillac. Dilecto is 50 different materials with more combinations and variations in desired properties than we can tell you here.

But Dilecto has three important qualities that you should think about if you buy, design, or machine laminated plastics.

DILECTO HAS HIGH MECHANICAL STRENGTH

Mechanical strength is frequently an important determining factor in the selection of an insulating material. Insulating parts used in large electrical power equipment are frequently bulky. The high mechanical strength of Dilecto helps reduce size-dimensions of insulating parts without danger of failure. Instruments, meters and small motors frequently require very small insulating parts which must withstand comparatively large mechanical stresses. Insulation for use in high frequency circuits should have a minimum bulk factor for minimum dielectric losses. Dilecto fulfills these requirements with a combination of high mechanical strength and low loss factor, characteristic of the better C-D-F electrical grades.

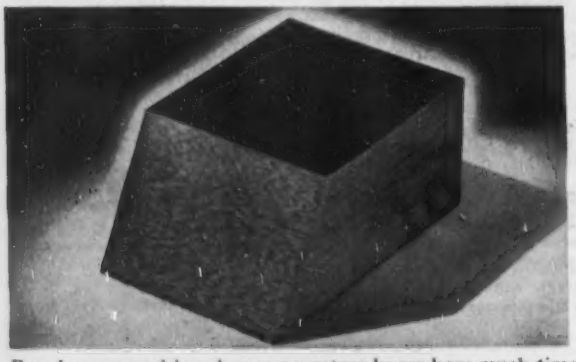
So C-D-F selects for your Dilecto insulation grade the correct, highest quality base material, paper, cotton, nylon, glass. These are used in combination with improved penetrating resins: Improved Phenolic, New Melamine, New Silicone, New Teflon, all synthetic, well polymerized resins.

Both the base and the resin are good insulators by themselves. But C-D-F sells them to you in an improved, practical form . . . Dilecto. Uniform sheets, tight tubes, strong rods, close tolerance machined and formed specialties, high bond strength metal clads.

Why does Dilecto combine so well mechanical strength with dielectric strength and dimensional stability? Because Dilecto is almost homogeneous, a true blend of resin and base.

DILECTO IS ALMOST HOMOGENEOUS

A poor laminate absorbs moisture at its edges, loses its insulating properties fast. Entrapped moisture and other volatiles within the cured structure causes inconsistent dielectric strength, with ultimate puncture and breakdown.



Punch press and bench saw operators know how much time and material is saved when the laminated plastic is *uniform* and *homogeneous* in nature like Dilecto.

DILECTO IS IMPROVED

Yes, C-D-F Dilecto is an improved laminated plastic, due to high standards and advances in resin and manufacturing techniques. It is watched by skilled workers in our modern plants, checked against rigid standards . . . C-D-F standards . . . by our quality control people. It is easy to machine, and the C-D-F shops are doing a booming business in specialties.

Table I—Typical Improved Phenolic Laminates

Commercial designation[a]	Resin	Filler	Improved properties	Improvement due to:
MEC-5	Phenolic	Nylon fabric	Insulation resistance; moisture resistance	Filler
XXHV-2[b]	Phenolic	Paper	High dielectric strength parallel to laminations	Resin and manufacturing technique
CRD	Phenolic	Cotton mat	Better machining	Filler
XXXP-26[b]	Phenolic	Paper	Insulation resistance; moisture resistance	Resin and manufacturing technique
C-92	Xylenol[c]	Cotton fabric	Alkali resistance	Resin
CF	Modified phenolic	Cotton fabric	Postforming	Resin

[a] All grades are Continental-Diamond Fibre Company.
[b] Resins have improved penetrating properties and the manufacturing techniques use these properties to provide better impregnation of the filler. Since thorough impregnation eliminates entrapped moisture and air, greater moisture resistance and better dielectric properties are attained. Manufacturing techniques also provide suitable temperature control during the curing stage to assure uniform quality and optimum property values in the finished laminate.
[c] Xylenol is essentially a dimethyl phenol.

—from Electrical Manufacturing Article "Wider Design Opportunities with the NEW Phenolics", Part II.

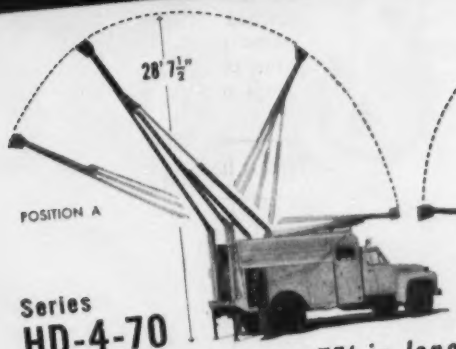
The next time you think of laminated plastics, the name to remember is C-D-F Dilecto. The improved, high strength, uniform material that makes insulation buying and using more a science, less a puzzle. New grades, new applications, new savings are just part of the Dilecto success story. Look up the facts in Sweet's Design File, or write for catalog. Send us your blueprint for quotation . . . tell us your design dream . . . C-D-F wants to work with you.

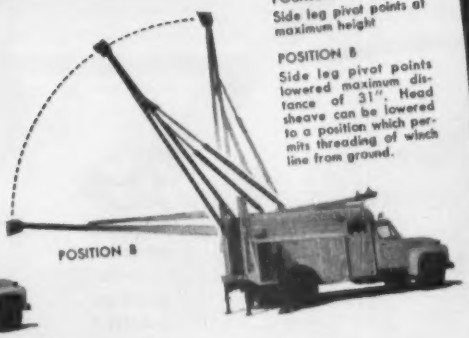
C-D-F *Continental-Diamond Fibre*

CONTINENTAL-DIAMOND FIBRE COMPANY
NEWARK 15 DELAWARE

- POWERS *American*

"Pole-Master" HYDRAULIC DERRICKS





POSITION A
Side leg pivot points at maximum height

POSITION B
Side leg pivot points lowered maximum distance of 31". Head sheave can be lowered to a position which permits threading of winch line from ground.

Series HD-4-70

Handles poles up to 75' in length

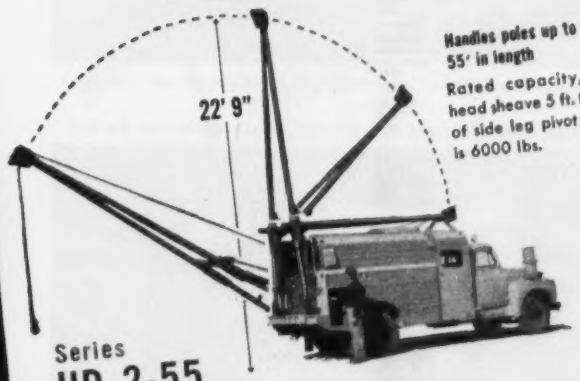
This is a heavy-duty derrick which can be operated by one man. Every movement—from carrying position to any point within the operating range—is hydraulically actuated. Shifting of control levers is the only manual requirement.

The derrick can be spotted in any position selected by the operator . . . and can be moved under load.

What's more, the position of the head sheave can be raised or lowered a distance of 31" . . . hydraulically . . . without changing angle of elevation.

With head sheave fully extended, 5 ft. to rear of side leg pivot points, the derrick has a capacity of 9000 lbs.

Complete details are given in Powers-American Bulletin No. 407. A copy, with quotation, is yours for the asking.



Handles poles up to 55' in length

Rated capacity, with head sheave 5 ft. to rear of side leg pivot points, is 6000 lbs.

LIVE BOOM — CAN BE OPERATED UNDER LOAD

HYDRAULIC HEIGHT ADJUSTMENT

CAN BE USED WITH SINGLE-DRUM WINCH

NO BODY LOAD AREA OBSTRUCTION — NO DANGEROUS EXPOSED MECHANISM

Series HD-2-55

Operation is completely hydraulic. Insertion and removal of locking pins, and shifting of control is the only manual requirement.

The derrick can be spotted in an unlimited number of positions, and moved while under load. It will lift loads to body cargo area.

Descriptive Bulletin No. 405R, with quotation, will be sent on request.

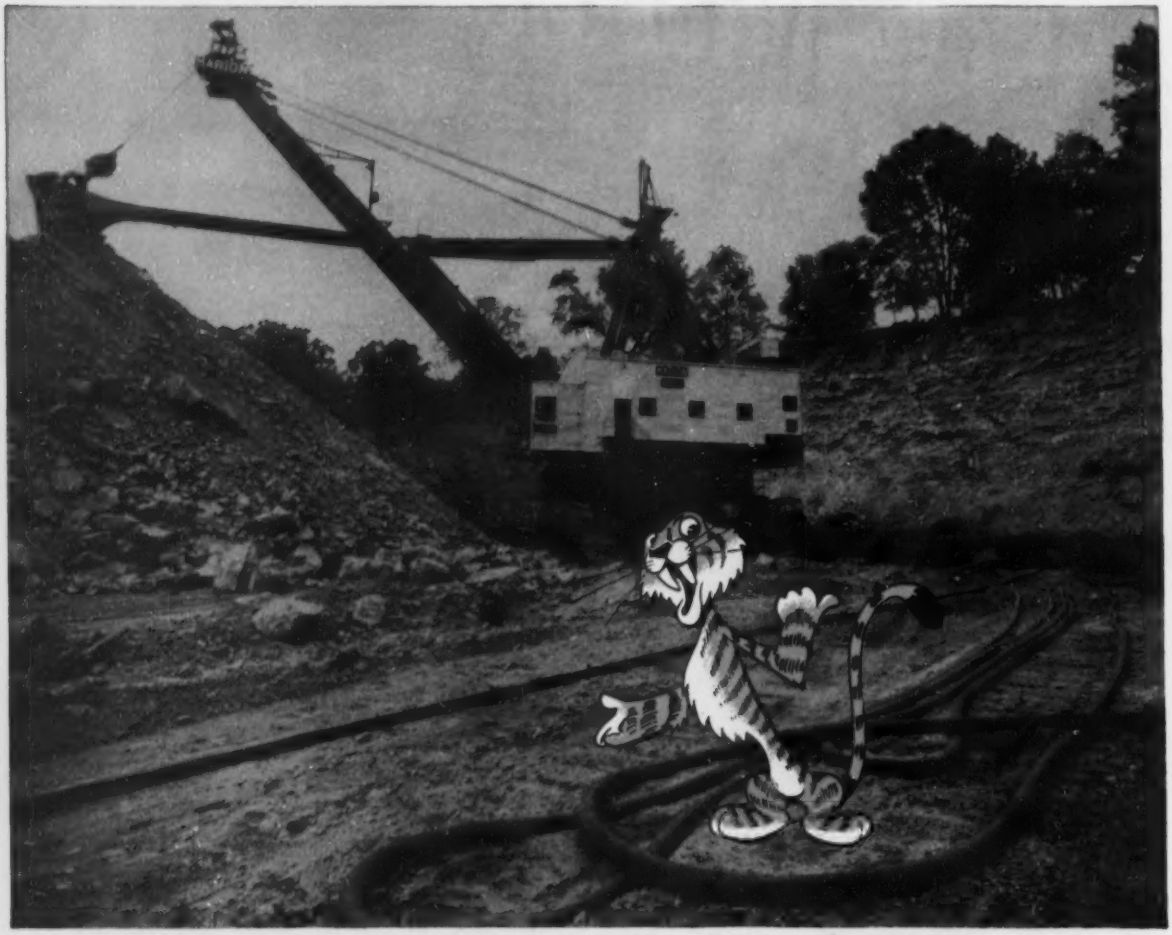
SERIES HD-2-40 Same as above, with 20' 10" ground-to-head sheave height.

POWERS-AMERICAN DIVISION

McCABE-POWERS AUTO BODY COMPANY

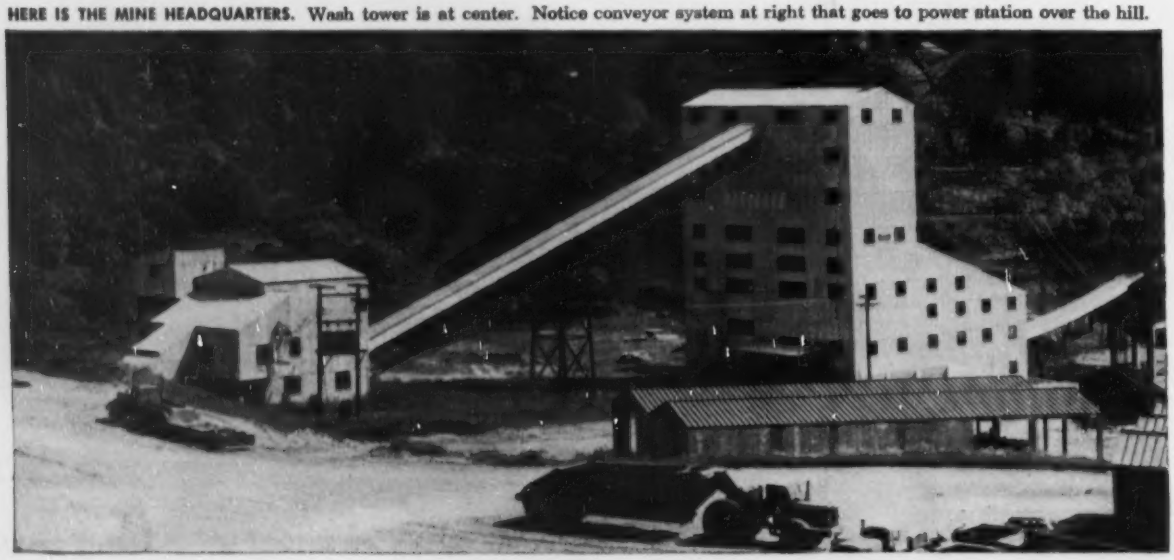
5900 NO. BROADWAY • ST. LOUIS 15, MO.
428 LATHAM SQ. BLDG. • OAKLAND 12, CALIF.

They needed a top quality cable



THE 18-CUBIC-YARD SHOVEL moves a lot of overburden in a hurry. It is supplied with 7500 feet of 3-conductor 1/0 Tiger Brand Amercland.

HERE IS THE MINE HEADQUARTERS. Wash tower is at center. Notice conveyor system at right that goes to power station over the hill.



like *Tiger Brand* for this high production strip mine

HERE IS A PORTRAIT of the 45-cubic-yard shovel that has removed most of the overburden at this mine.

IF you take a ride out near Zanesville, Ohio, someday, you'll spot the new Muskingum Mine—probably the most modern strip mine in the world. It supplies coal for the new 400,000 kw Muskingum River Plant of The Ohio Power Company, part of the American Gas and Electric System.

The big 18 and 45-cubic-yard electric power shovels operate day and night through sun, rain or snow. And when you consider the eye-popping cost of lost production time, it's easy to see why these shovels need the most dependable power cable on the market. At this mine, it's 100% Tiger Brand Amerclad.

The cable is always exposed to foul weather and accidental abuse. It often stretches for more than a *mile* from switchgear to shovel take-up reel. Yet, after more than 2 years on the job, the Tiger Brand Amerclad is in perfect condition without sign of wear.

If you need a cable that can *take it* . . . if you want cable for a power shovel, dredge, mine locomotive, welding machine or a heavy-duty electrical hand tool—you'll get more for your money if you specify Tiger Brand Amerclad. Drag it through puddles, over sharp rock; spill gasoline or oil on it and expose it to sun and ozone. Tiger Brand will still give you service you never thought possible. *Send the coupon.*

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION, GENERAL OFFICES: CLEVELAND, OHIO
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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB!

paper & varnished cambric cable	shovel & dredge cable
asbestos wire and cable	mold cured portable cord
aerial, underground & submarine cable	machine tool & building wire special purpose wire & cable

—SEND THE COUPON—

American Steel & Wire Division
Room EE-94, Rockefeller Building
Cleveland 13, Ohio

☐ Please give me more information about Amerclad.
☐ I'd like to talk to your representative.

Name .....
Firm .....
Address .....
City ..... State .....

USS Tiger Brand ELECTRICAL WIRE & CABLE

USS

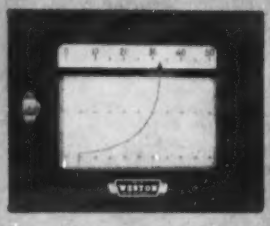
UNITED STATES STEEL

designer's INSTRUMENT guide

RUGGEDIZED INSTRUMENTS —to military specifications, available in 2½", 3½" and 4½" sizes in D-C, movable iron A-C, rectifier type A-C and thermo instruments. All have sealed, externally operated zero correctors—shock-resisting, flat plastic windows—and connection terminals molded into internal rubber.

ULTRA-SENSITIVE RELAYS —extremely compact and rugged relays which operate on values as low as ½ microampere or ¼ millivolt, direct from thermocouples, resistance bulbs or other generators of minute current. Handle substantial wattage at 110 volts on non-chattering magnetic contacts. Available with single or double contacts, fixed or adjustable, manual or solenoid reset.

"MOTOR LOAD %" METERS —WESTON "per-cent load" ammeters and wattmeters make it easy for operators to secure optimum production from lathes, milling machines, automatics, grinders, etc. Prevent overloading—reduce tool breakage—assure uniform quality with fewer objects. Other scale calibrations available.



RECORDING POTENTIOMETER —ideal for built-in needs because of its extreme compactness plus ruggedness and simplicity. Ranges changed simply by inserting required range standards. Chart speeds changed by simple screwdriver adjustment. Plug-in amplifier removed in a jiffy since no soldered connections are used.

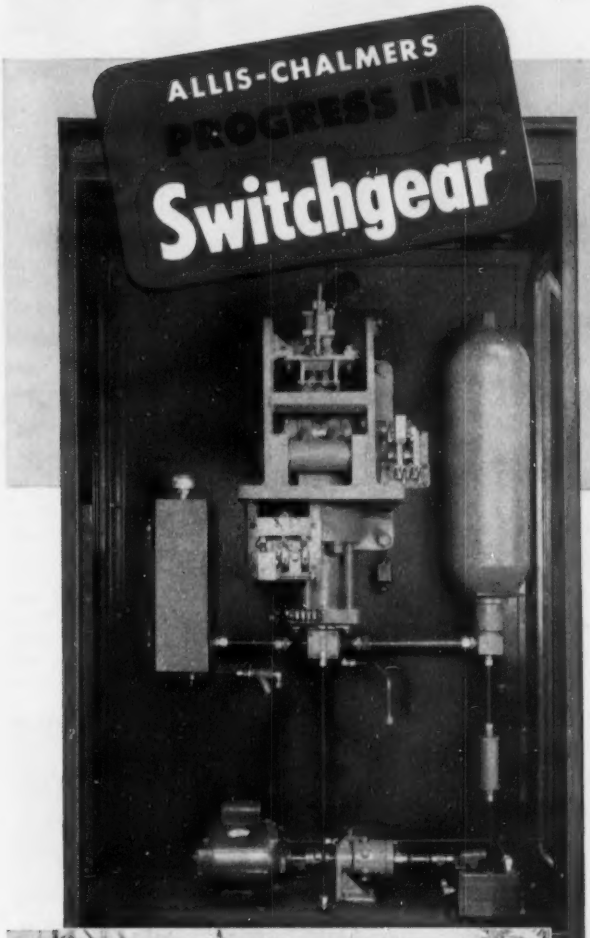
Literature on any of the above instruments sent on request.
WESTON Electrical Instrument Corporation,
614 Frelinghuysen Avenue, Newark 5, New Jersey.

B106

WESTON *Instruments*

"Pneu-Draulic" Operating Mechanism for Breakers

Looks Simple...IS SIMPLE!



Only 1 adjustment in hydraulic system...
to position the spool valve.

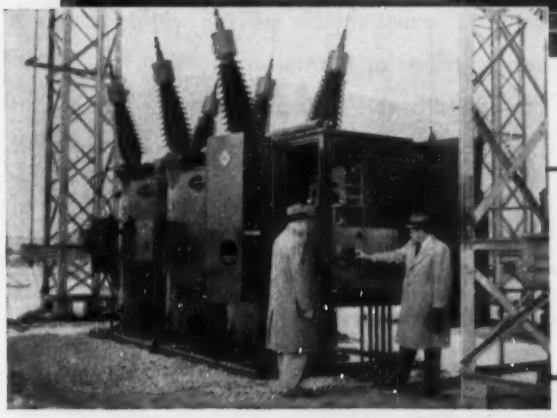
Only 2 moving parts in hydraulic control...
the spool valve and its control.

This simplicity of design was an important factor in the performance of *Pneu-Draulic* operators during the past year at an eastern power company. But this is only one part of the story of simplicity. It's simple to maintain as well.

Note the wide open accessibility — the short lengths of pipe — the few parts. In addition, the system eliminates basic causes for maintenance. Dirt hazard is eliminated. In effect, it's a sealed system with efficient filtering. Corrosion problems are reduced, since oil in the system uses one of the best corrosion inhibitors known. Moisture condensation problems are eliminated, since the system is filled with oil. Even manual closing is simpler, because provision for manual closing is built in.

Find out more about the breakers with the *Pneu-Draulic* operating mechanism. Call your nearby A-C office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4375

Pneu-Draulic is an Allis-Chalmers trademark.



New Operator Mechanism Has Excellent Record

Four 115-kv Allis-Chalmers circuit breakers at an eastern power company have operated almost a year with a total of over 4000 operations.

ALLIS-CHALMERS

DESIGNED FOR YOUR APPLICATIONS

Rugged construction at pressure points, more than adequate cross-sectional strength and rough ground, perfectly fitting contact surfaces are key design features that enable Southern States connectors and bus supports to perform as dependable links in your power equipment chain.

The wide range of types and sizes in connectors and bus supports for all types of conductors simplifies your choice of the right Southern States fitting for normal application.*

Southern States' 160 page Connector and Bus Support catalog lists and illustrates all fittings. It is indexed and cross-indexed for quick reference. Write for your copy on your letterhead.

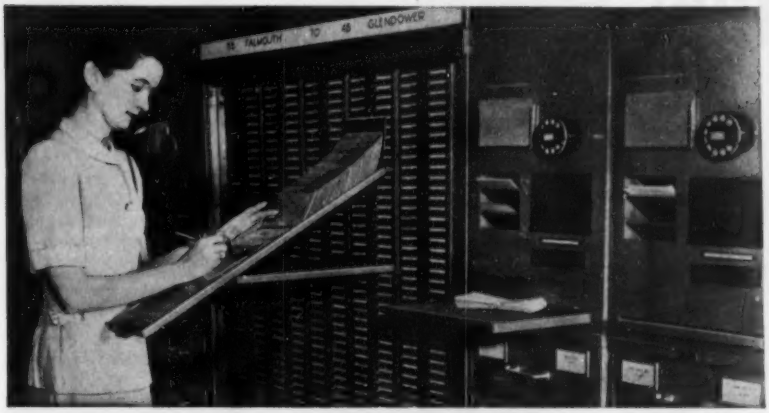
**Special designs can be supplied to meet specific requirements.*

SOUTHERN STATES EQUIPMENT CORP.
HAMPTON, GEORGIA

Remington Rand

BETTER BUSINESS METHODS

For Greater Profits Through Lower Costs



Could You Handle a 300% Surge in Service Calls in One Day, with no Stress or Strain?

This Customer Service System, at work in a New England public utility, boosts public relations daily and cuts costs. All service records on a given group of street addresses "belong" to one clerk, who handles any call for service or information within her group promptly and accurately, *before* the customer leaves the phone. This eliminates duplicate and inaccurate orders, speeds service and cuts truck time of men performing the work.

In the pocket corresponding to each street location are a master card, a traveling meter order, and a traveling service investigation form which serves to originate actual field maintenance. For more details on this Customer Service System and its huge potential, see Booklet X1498.

Unit Bookkeeping Plan Ends Specialized Customer Accounting, Adds "Point-of-Use" Record Protection

Under the Unit Plan, all "bill information" inquiries are answered quickly from this one source . . . the Unit Plan Safe-Desk. Records stay at a desk permanently, and each clerk becomes familiar with "her" 8,000 to 9,000 accounts, boosting accuracy, production and morale.

The Unit Plan provides for fair comparison of quantity and quality of work performed by each clerk. And, insulated Safe-Desks protect records from fire at "Point-of-Use" 24 hours a day. For more facts on Unit Plan Bookkeeping in the public utility field, read Booklet X1498.

Customer Service Counter Modern and Functional; Solves Customer Cashiering and Bookkeeping Problems

The new sectional customer service counter may be used alone, or with other units, to provide any desired number of work stations. The counter is open and friendly in appearance, promoting pleasant customer relations. It offers ideal counter height for making out checks and applications, plus a convenient, continuous parcel shelf.

The counter's compact working side holds all cashiering and bookkeeping facilities within arm's reach. Fatiguing, "stand-up" counter cashiering is eliminated. Certified insulated units protect valuable records at "Point-of-Use" 24 hours a day. Read more about this efficient public relations tool for public utilities in Booklet X1498.

12 Fact-Filled Pages For Public Utility Executives

Your free copy of "Public Relations In Action", Booklet X1498, is waiting for you. The coupon below is for your convenience. Mail it today!

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U-1

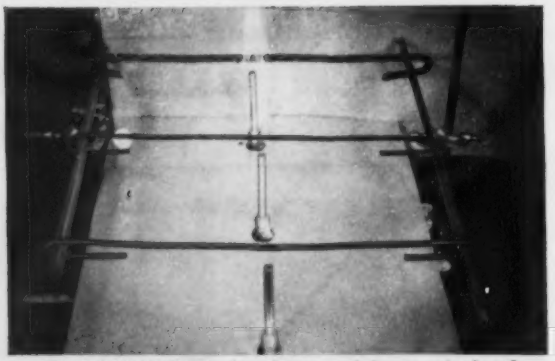
Profit-Building **IDEAS** For Business

Polyethylene shows up best in test for flame resistance

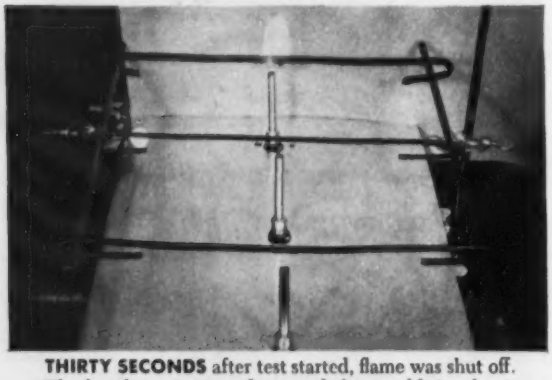
Wire Covering Outlasts Braid and Rubber-Type Compound

You can make this simple test in your own laboratory. The materials are easy to come by —three Bunsen burners, a supporting frame, and three lengths of No. 6 conductor line wire. One wire is covered with weatherproof braid, another with a rubber-type compound, and the third with BAKELITE Polyethylene compound DE 6401 Black 99.

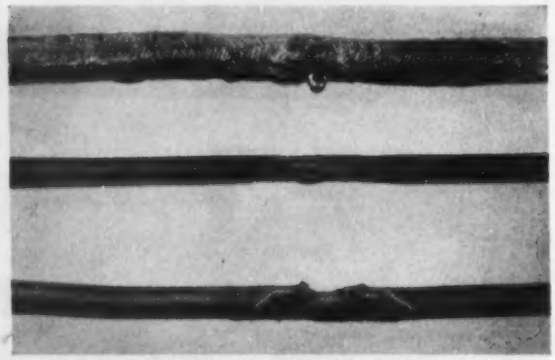
Just how well BAKELITE Polyethylene made out in this flame resistance test is indicated in the photographs. For complete details on how the test was carried out, write Dept. YT-63 requesting a free copy of KABELITEMS No. 72.



FIFTEEN SECONDS after the start of the test, the braid covering (top) has started to burn. First spot appears on aluminum sheet placed under samples to catch drippings. Polyethylene (center) and rubber-type compound (bottom) are relatively unharmed.



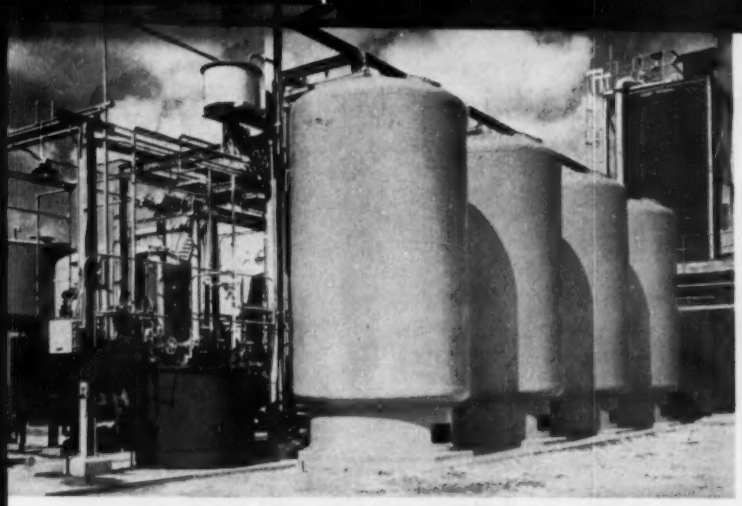
THIRTY SECONDS after test started, flame was shut off. The braid continues to burn and shows additional evidence of dripping. No continued flame or dripping is shown by polyethylene or rubber-type compound, although latter is more severely charred.



TWO AND A HALF MINUTES after the burners were lighted, most of the insulating compound has left the braid-covered wire, while the rubber-type compound has fallen away, exposing the conductor. Polyethylene shows evidence of charring, but still covers conductor.

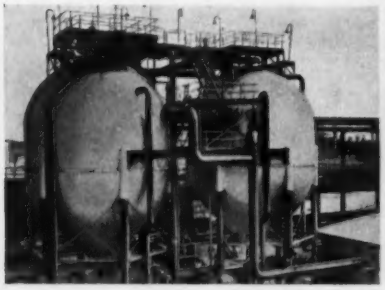
BAKELITE
TRADE-MARK
Polyethylene
FOR WIRE COVERING

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N. Y.
In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Belleville, Ontario



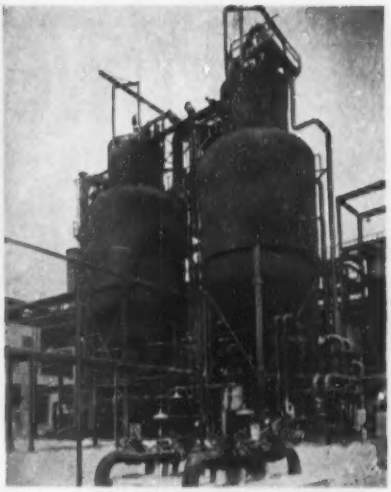
Automatic Demineralization and Silica Removal. *Permutit Ion Exchangers deliver the equivalent of distilled water at far less cost. Eliminate makeup shortages . . . operate independently of changes in turbine load. Fully automatic operation insures precision performance.*

WHICH Permutit Process will solve YOUR water problem?



Sludge-Blanket Hot Lime-Soda Softener *reduces hardness . . . silica . . . alkalinity and turbidity. Fully utilizes Permutit sludge-blanket principle to improve performance.*

Precipitator *clarifies and softens cold water. Uses less space, time and chemicals than previous designs. Removes hardness, turbidity, color, iron, manganese. Reduces silica, alkalinity.*



Deaerating Heater *removes troublesome oxygen and CO_2. Prevents corrosion and pitting of feed lines, stage heaters, economizers and boilers at high temperatures. Steam is used twice . . . deaerates water completely.*

Your Permutit sales engineer can help you decide . . .

Making the wisest choice requires time-consuming consideration of all types of equipment, ion exchange materials, controls, accessories. That's where Permutit can help you.

Permutit Sales Engineers work with a complete range of equipment—all types, all sizes. They do not have to compromise by trying to fit one specific process to your plant.

They can recommend with impartiality the one proper combination of equipment and materials that best solves your problem. For only Permutit manufactures both ion exchange resins and all types of water conditioning equipment.

This results in better performance at lower operating cost . . . undivided responsibility for the complete plant . . . plus savings of time and money in planning and specification.

For aid in solving your water problem, write to The Permutit Company, Dept EW-9, 330 West 42nd Street, New York 36, N. Y., or Permutit Company of Canada, Ltd., 6975 Jeanne Mance Street, Montreal.

ION EXCHANGE AND WATER CONDITIONING HEADQUARTERS FOR OVER FORTY YEARS

PERMUTIT®

FORECAST: Electrical Utilities to Increase

Phelps Dodge will help you meet your Expanding Power Cable Needs!

PRACTICAL EXPERIENCE IN RESEARCH, COMPLETE RANGE OF HIGH

THE electric utility industry will increase its generating capacity by 13 million KWH in 1954.* Phelps Dodge is meeting this constant high-voltage power cable expansion program with research, design, and manufacturing know-how. Year after year, Phelps Dodge has met utility demands for cables with higher voltage ratings and greater carrying capacities. Phelps Dodge's experience, research facilities and engineering skill are the answer to your cable requirements regardless of voltage or type.

Electrical World

PHELPS DODGE COPPER PRODUCTS CORPORATION

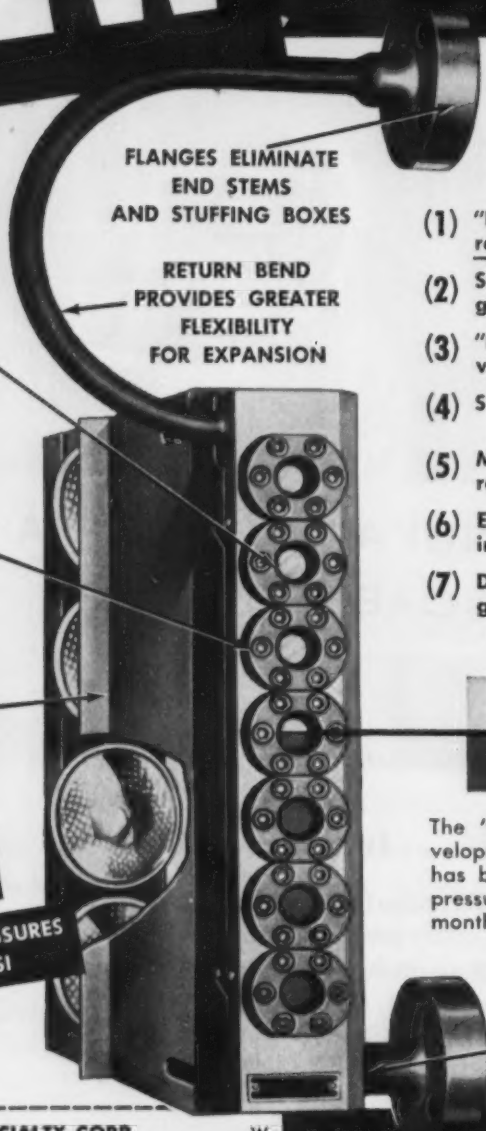
Generating Capacity 13 Million KWH in 1954

DESIGN AND MANUFACTURE OF A VOLTAGE POWER CABLES!

69 KV...to...230 KV

Typical examples of Phelps Dodge power cables engineered to meet modern utility power requirements. On the left: self-contained, three-conductor, medium pressure, gas, 69 KV cable. On the right: the highest voltage cable to be installed in the United States, a pipe-type, three-conductor, oil compression, 230 KV cable.

NEW DIAMOND "MULTI-PORT" Bi-Color Gauge



FLANGES ELIMINATE END STEMS AND STUFFING BOXES

RETURN BEND PROVIDES GREATER FLEXIBILITY FOR EXPANSION

SMALL ROUND INDIVIDUAL PIECES OF MICA AND GLASS

PORT PARTS REPLACED WITHOUT REMOVING GAUGE FROM BROILER

"HI-LITE" ILLUMINATOR

FOR BOTH NEW AND OLD BOILERS

FOR BOILER PRESSURES TO 3000 PSI

STEAM SHOWS RED

WATER SHOWS GREEN

WELDED CONSTRUCTION ASSURES PERMANENT TIGHTNESS

6962

"MULTI-PORT" Advantages:

(1) "Bi-Color" principle shows steam red and water green

(2) Small round ports instead of long glass strips

(3) "Hi-Lite" Illuminator for improved visibility

(4) Simplified high-pressure construction

(5) Maximum thermal stability for rapid starting

(6) Easy, inexpensive maintenance . . . in place

(7) Direct reading . . . basic reference gauge

The "Multi-Port" gauge has been developed over a four-year period and has been in continuous successful high pressure operation for more than 18 months in several leading central station plants. For additional information, write for new Bulletin 1174W . . . use the coupon below.

SEND TODAY

DIAMOND POWER SPECIALTY CORP. W
LANCASTER, OHIO

Please send me without obligation a copy of new Bulletin No. 1174 explaining the advantages of the Diamond "MULTI-PORT" Bi-Color Gauge.

NAME_____

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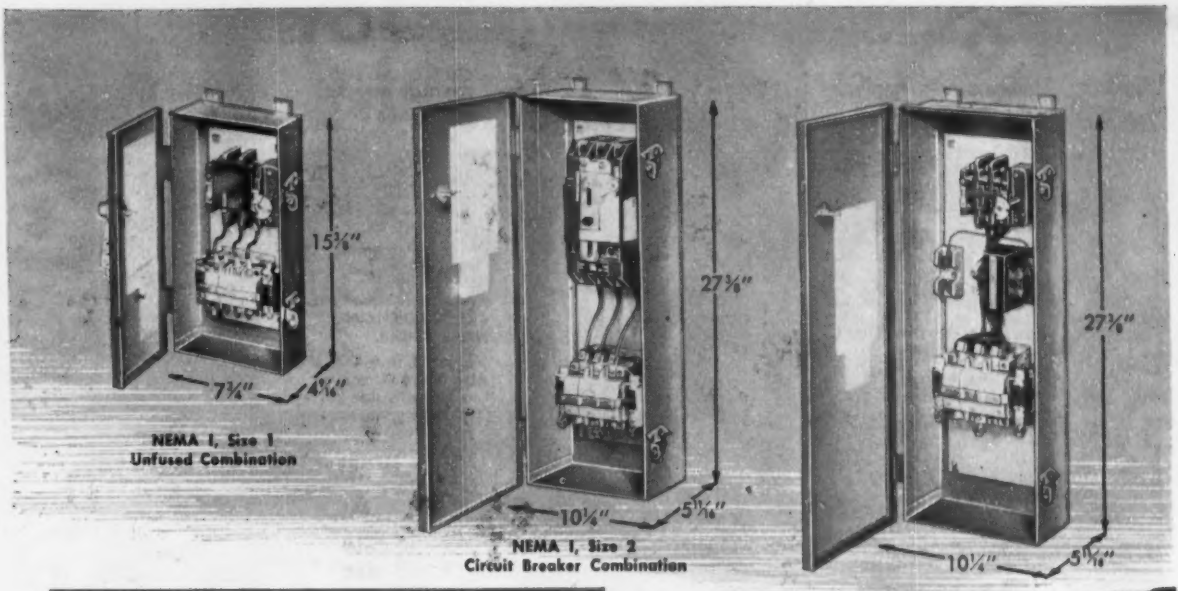
DIAMOND POWER SPECIALTY CORP.
LANCASTER, OHIO
Diamond Specialty Limited—Windsor, Ontario



NEMA 1, Size 1
Unfused Combination

NEMA 1, Size 2
Circuit Breaker Combination

NEMA XII, Size 2
Unfused Combination

New PERFORMANCE STANDARDS

for new machines or old with

ARROW-HART

TYPE "RAC"

COMBINATION STARTERS

ENCLOSURES:

- GENERAL PURPOSE (NEMA TYPE 1)
- INDUSTRIAL USE (NEMA TYPE XII) . . . built to JIC STANDARDS
- Also for Textile and Other Industrial Applications

AVAILABLE:

- WITH DISCONNECT . . . Fused or Unfused
- WITH CIRCUIT BREAKER TYPE DISCONNECT
- IN ACROSS-THE-LINE, REVERSING and TWO-SPEED TYPES
- IN NEMA SIZES 0, 1, and 2
- WITH AND WITHOUT CONTROL CIRCUIT TRANSFORMER, LOCAL CONTROL, AND OTHER MODIFICATIONS

Combining radically smaller size and lighter weight with the advantages of advanced safety and dependability, these revolutionary Arrow-Hart Type "RAC" Combination Starters outwork . . . outlast . . . outmode every other type. An all-new, front-operated disconnect—a new line of enclosures in NEMA Types I and XII — and the exclusive A-H "Right Angle" Starter set new standards for maintenance ease, superior performance, and control versatility.

YES! Arrow-Hart Type "RAC" Combination Starters will help all machines—*old and new*—realize their full productive efficiency. Extreme dependability helps eliminate costly down-time . . . smaller size, easily accessible contacts, and extra room in the enclosure provide the ultimate in installation and maintenance ease . . . Straight-Thru wiring improves safety standards.

You owe it to yourself to write for complete information — NOW!

MAIL THIS COUPON TODAY

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INDUSTRIAL CONTROL DIVISION

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Quality MOTOR CONTROLS • WIRING DEVICES
ENCLOSED SWITCHES • APPLIANCE SWITCHES

INDUSTRIAL CONTROL DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO.
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☐ *Please send literature describing the Type "RAC" Combination Starter.*
☐ *Please send catalog covering the complete AH-Motor Control Line.*

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POSITION _____
COMPANY _____
COMPANY ADDRESS _____
CITY _____ ZONE _____ STATE _____

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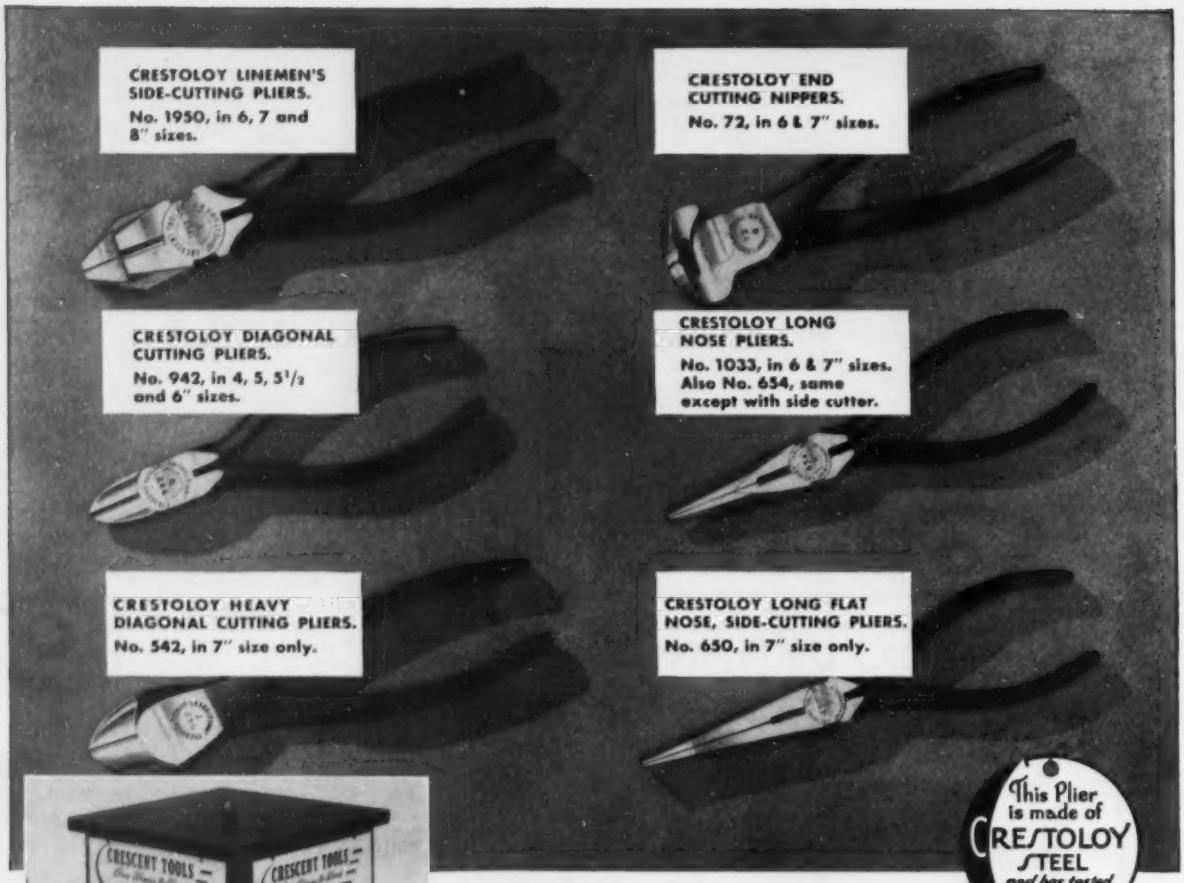
CRESTOLOY LINEMEN'S SIDE-CUTTING PLIERS.
No. 1950, in 6, 7 and 8" sizes.
CRESTOLOY END CUTTING NIPPERS.
No. 72, in 6 & 7" sizes.
CRESTOLOY DIAGONAL CUTTING PLIERS.
No. 942, in 4, 5, 5½ and 6" sizes.
CRESTOLOY LONG NOSE PLIERS.
No. 1033, in 6 & 7" sizes. Also No. 654, same except with side cutter.
CRESTOLOY HEAVY DIAGONAL CUTTING PLIERS.
No. 542, in 7" size only.
CRESTOLOY LONG FLAT NOSE, SIDE-CUTTING PLIERS.
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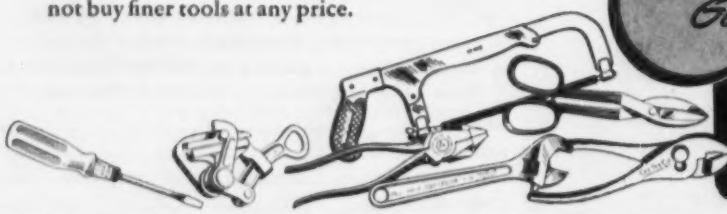
This Plier is made of CRESTOLOY STEEL and has tested 100% satisfactorily

CRESTOLOY PLIERS

are individually tested!

Crestoloy Pliers take all the guesswork out of plier buying, because Crescent has taken all the guesswork out of plier making. Rigid specifications establish the material, design, workmanship, tests and inspection of these better tools. Strict adherence to these specifications is maintained by continuous tests and relentless inspection of the *individual* tools. Every plier carries the Crestoloy tag certifying that it has been individually tested.

Your hardware dealer carries a wide selection of Crescent and Crestoloy Tools. You cannot buy finer tools at any price.



CRESCENT TOOLS
Give Wings to Work
Sign of the Artisan Symbol of Excellence

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

This single-phase power regulator has

5 ratings... 5 ranges of regulation

25 possible combinations!

CHANGE RATINGS IN SECONDS. *Vari-Amp* indicator saves time, makes more flexible regulation possible at low cost. To change rating, just open the window and place stop screws in proper place. No electrical connections to make—no need to remove regulator from service when making this adjustment.

Provides Flexibility For System Growth

HERE'S HOW IT WORKS: The *Vari-Amp* feature provides *five* intermediate steps for increasing current capacity instead of the two provided on all other regulators. You can meet regulation requirements at less expense in most cases. And when loads grow, changes are easier, costs less because ranges of regulation need to be reduced only proportionately instead of sliced in half as with other regulators. Extra short-circuit capacity is available. No other regulator offers flexibility like this.

The *Vari-Amp* feature permits increasing ratings to 114%, 133%, 160% and 200% with corresponding reduction in percentage of regulation. This reduction is proportionate to the rating increase, and is in five gradations from the original range of 20% to 10%.

Permits Unequal Range of Regulation

The *Vari-Amp* feature permits unequal range of regulation. You can retain full 10% lower if current is low. Then the regulator operates less than 10% in the raise direction at heavier loads, and at full 10% in the lower direction at lighter loads.

In addition to multiple ratings, on Allis-Chalmers single-phase power regulators you get low exciting current, low maintenance, *Quick-Break* tap-changing mechanism, and close, accurate control. Get more facts on the next page.

A-4458

ALLIS-CHALMERS

Originators of 5/8% Step Regulation

For high profit, low maintenance

Vari-Amp feature brings you these extra ratings

Volts	Kva of Regulator	±10%	±8¾%	±7½%	±6¼%	±5%
2400	12	50 amp	57 amp	66.5 amp	80 amp	100 amp
	24	100	114	133	160	200
	36	150	171	200	240	300
	48	200	229	267	320	400
	60	250	286	334	400	
	72	300	343	400		
	96	400				
4800	12	25	28.6	33.3	40	50
	24	50	57	66.5	80	100
	36	75	85.7	100	120	150
	48	100	114	133	160	200
	60	125	143	167	200	250
	72	150	171	200	240	300
	96	200	229	267	320	400
	120	250	286	334	400	
	167	348	397			
6900	17.3	25	28.6	33.3	40	50
	34.5	50	57	66.5	80	100
	69	100	114	133	160	200

Extra Short-Circuit Capacity Available

25 times normal short-circuit capacity available with each of these current ratings gives short-circuit capacities as high as 10,000 amperes on smaller units.

Low excitation current means lower installed cost

A major cost savings is possible using Allis-Chalmers single-phase power regulators. It's because of the savings on capacitors normally needed to offset excitation current in the regulator. Allis-Chalmers step-type single-phase power regulators require only ⅓ the excitation of other types of regulators.

No other standard single-phase power regulator can offer this type of saving. In addition, low exciting current releases system capacity for useful loads.

The difference in exciting current is in the fact that a step regulator has exciting current requirements like a transformer, rather than like an induction motor as do other types of regulators.

An example of savings in initial cost is shown in a 72-kva, 2400-volt regulator. Exciting current of a step regulator of this rating is 6.72 kva compared with the exciting current of the other type regulator, which is 20.16 kva. Adding capacitors to counteract the effect of the extra kilovars adds a total of 3.6% to the cost of the installation. On many systems this extra cost could run into thousands of dollars. For more information, write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 01B6065C, or call your nearby A-C office.

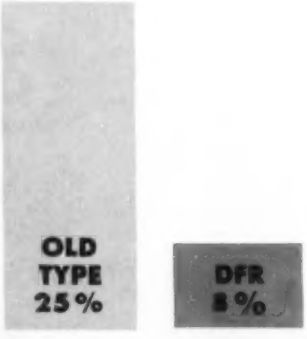


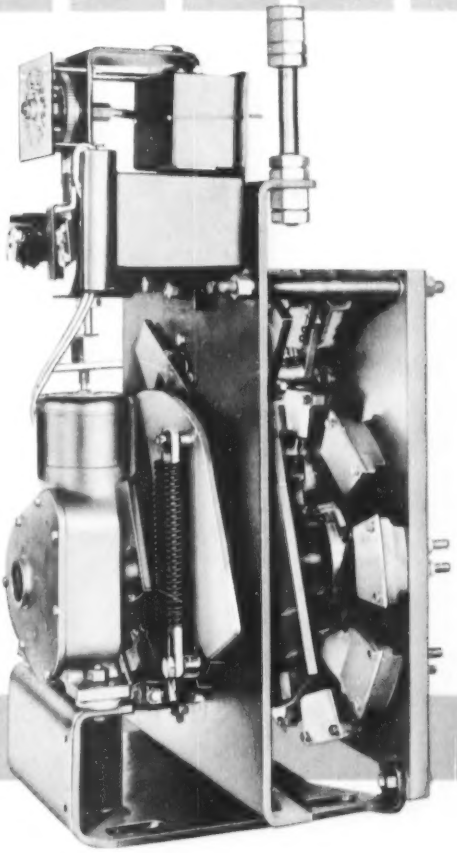
Chart shows difference in excitation requirements, comparing the other type single-phase power regulator with an Allis-Chalmers single-phase regulator.

Regulation!

Famous *Quick-Break* mechanism provides proved reliability, low maintenance

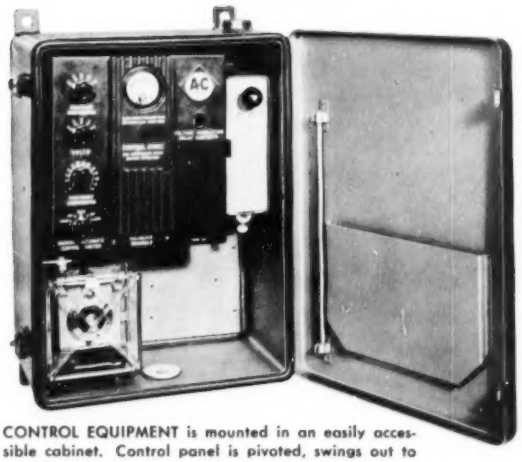
All Allis-Chalmers step regulators use the rugged *Quick-Break* tap-changing mechanism. For more than 20 years this mechanism has proved the simplest, most reliable means of changing taps under load. Original laboratory tests proved it could withstand 100 years of operation. Field installations over the past two decades have borne out these tests.

All moving parts are immersed in oil, including tap changer, motor and mechanism. The motor has neither commutator, slip rings, brushes, nor centrifugal switch. Contacts are large and rugged — manufactured of special arc-resisting alloys. The entire mechanism needs no sealing-in switches or brakes — completely eliminates a major source of maintenance.



ALLIS-CHALMERS

5/8% STEP VOLTAGE REGULATORS



CONTROL EQUIPMENT is mounted in an easily accessible cabinet. Control panel is pivoted, swings out to facilitate inspection.

Feather-Touch control for close, accurate regulation

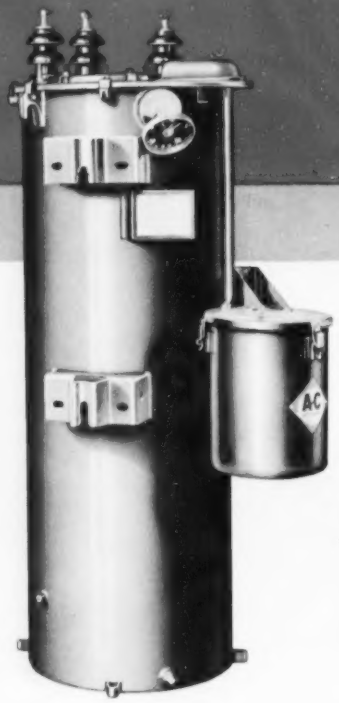
Automatic *Feather-Touch* control gives Allis-Chalmers single-phase power regulators Class I accuracy and a total band of only ± ¾ volt. Holding coils or holding-in magnets are completely eliminated. A dual cantilever suspension permits practically frictionless operation. Aging of springs cannot affect control operation.

Controls are mounted in a single chassis enclosed in a weather-tight cabinet on the front of the regulator where they are easily accessible. The voltage integrator permits the narrow band width setting without excessive operations. Large finger-fit control knobs simplify settings.

ALLIS-CHALMERS

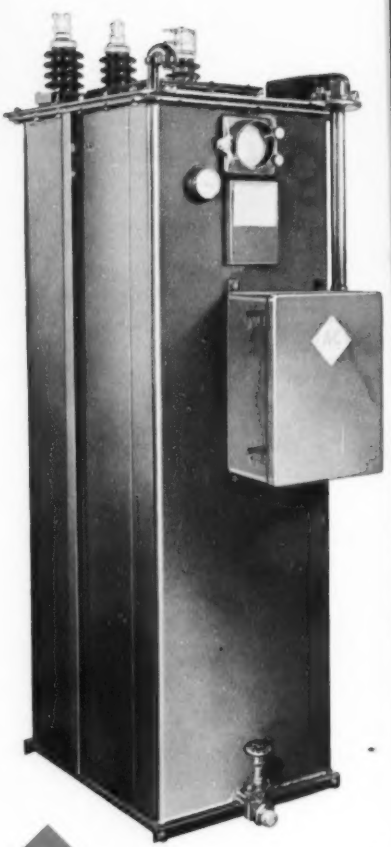
Originators of 5/8% Step Regulation

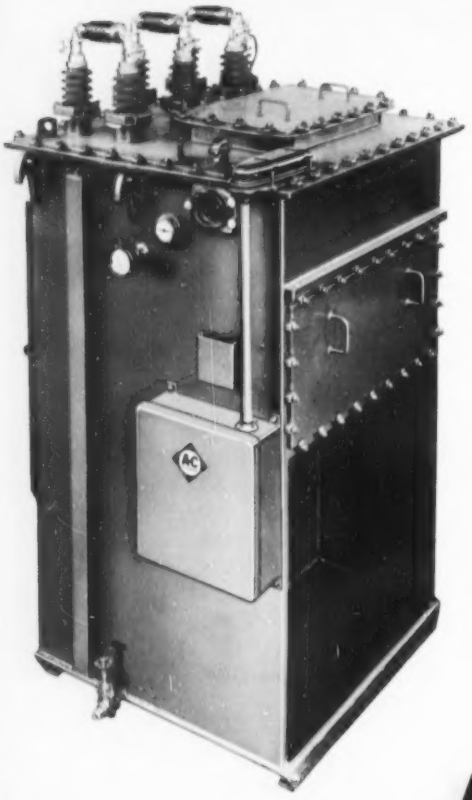
For Every Regulation Need



ALLIS-CHALMERS

5/8% STEP VOLTAGE REGULATORS





POWER REGULATORS are available in three-phase ratings through 69 kv, in sizes to 2500 kva. Single-phase units equipped with the *Vari-Amp* feature are available in standard sizes. Allis-Chalmers power regulators have been applied on more than 5 million kva in utilities throughout the country.

DISTRIBUTION REGULATORS bring all the advantages of Allis-Chalmers 5/8% step voltage regulators in ratings from 2500 to 14,400 volts, 15 to 200 amp. For complete information, see your nearby A-C office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

Milwaukee 1, Wisconsin

FOR POWER
Bituminous of every type for efficient burning in the latest pulverized-fuel installations
FOR COKING
Bituminous coals of exceptional quality for by-product coking
FOR STEAM
Firm-structured Bituminous with high heat values for every steam-plant use
FOR SPACE HEATING
Many varieties of non clinkering coals ideal for stoker use and hand firing
Always ready to serve you...

with a coal that's exactly right

Name your choice—in "Bituminousland" along the Baltimore & Ohio, we have it! Here Nature has stored a supply of economical heat and energy sufficient to last for centuries.

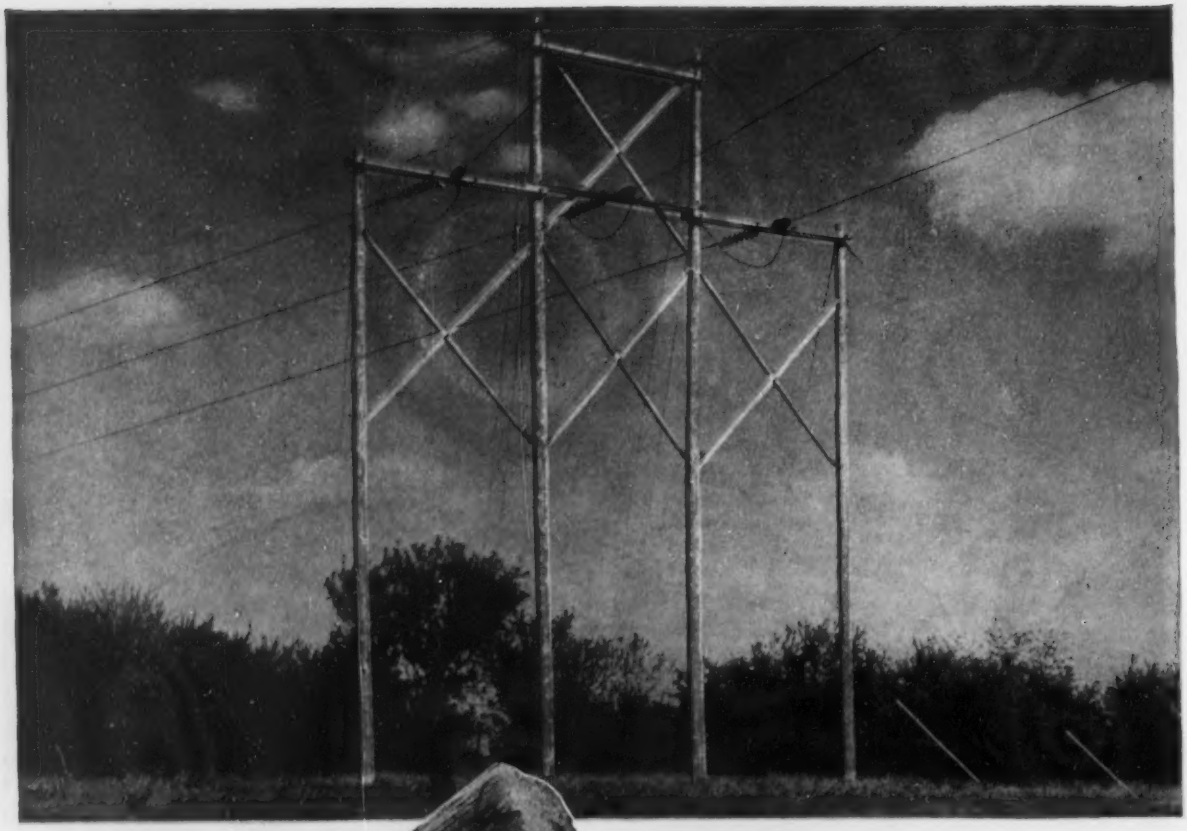
B&O Bituminous coals exist in wide variety. The mines that produce them are thoroughly mechanized so that costs are kept low, size and quality uniform. Nearness to industrial centers results in low transportation costs, and the ease of storing removes the need for expensive facilities. Furthermore, new methods and equipment have increased the burning value of Bituminous.

ASK OUR MAN! Let him direct you to the best coal for your needs, and explain proper firing methods. You'll be more than pleased at the improved efficiency, economy, and cleanliness of B&O Bituminous.

BITUMINOUS COALS FOR EVERY PURPOSE

BALTIMORE & OHIO RAILROAD

Constantly *doing things*—better!



Section of 15 Year test plot at Consolidated Minneapolis Plant

LONGER POLE-LINE SERVICE

begins with

LIFE-SPAN

research . . . testing . . . experience!

Endless, tireless laboratory research—test plots—poles in line under severe conditions for fast deterioration—years of development and research! Out of these have come the greatest pole treatment ever developed. LIFE-SPAN, the top-to-butt treatment permits power-line poles to defy age, weather, fungi—to give years and years of added trouble-free service.

Take nature's best (Western Red Cedar), add LIFE-SPAN "know-how" and you have unmatched pole life. Assure yourself of far lower yearly maintenance and replacement costs. Specify LIFE-SPAN Western Red Cedar Poles on your next construction job. They're clean, they're safe—*They're Tops!*

CONSOLIDATED TREATING CO.

MINNEAPOLIS, MINNESOTA

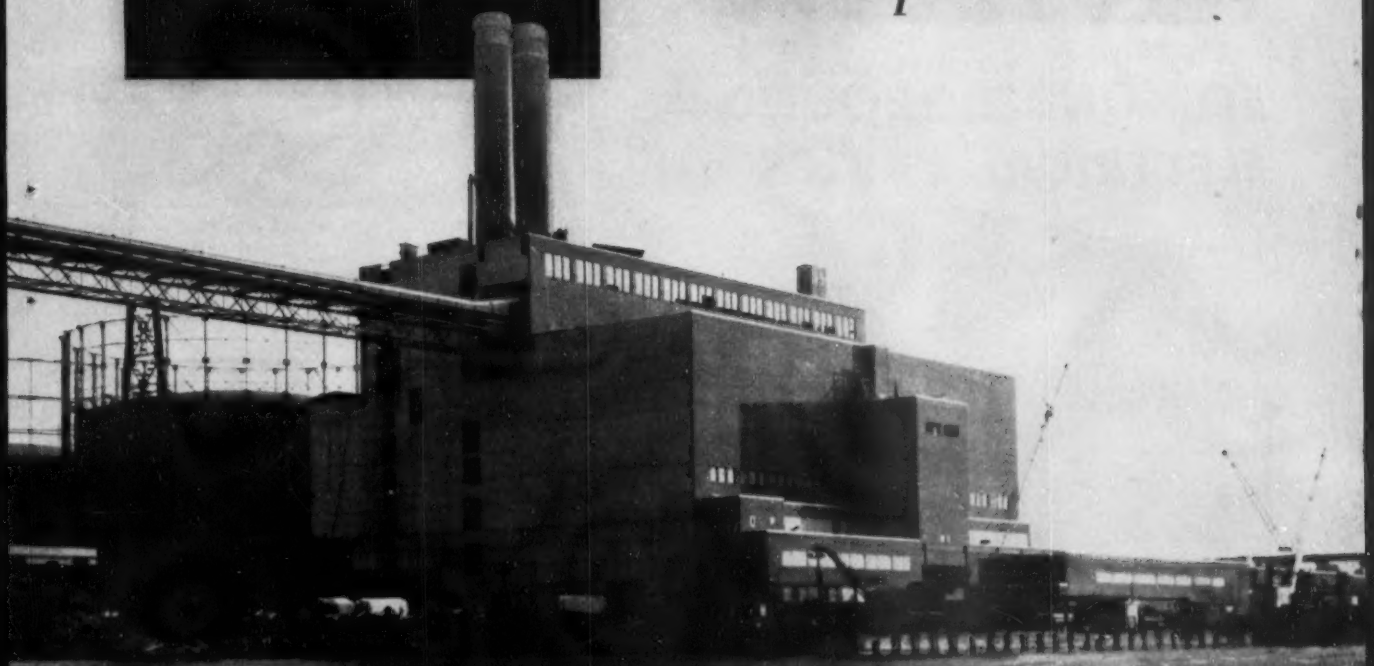
Life Span

Sold only by the following:

- Page & Hill, Inc., Minneapolis, Minnesota
  50 Church St., New York, N. Y.
- B. J. Carney & Co., Spokane — Minneapolis
- Schaefer-Hitchcock Co., Sandpoint, Idaho
  (Suppliers for Joslyn Mfg. & Supply Co.)
- Naugle Pole & Tie Corp., Chicago, Illinois

DE LAVAL
BARREL TYPE BOILER FEED PUMP

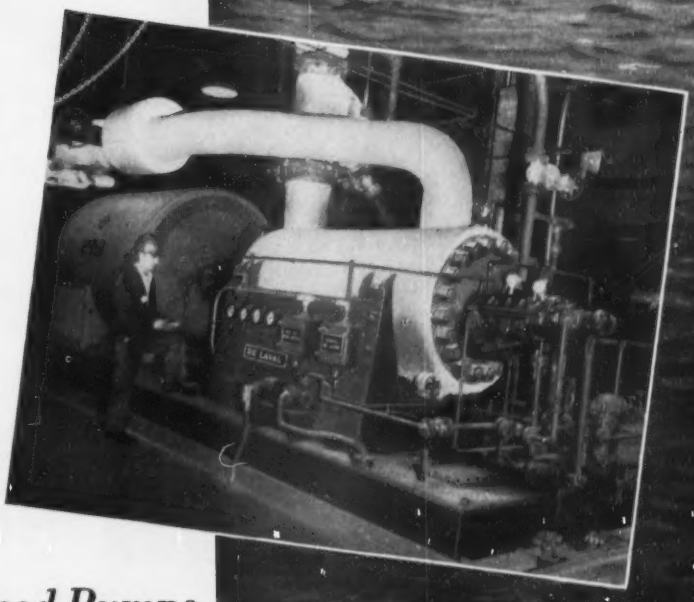
in new Con Edison Astoria power station



This De Laval 11-stage barrel type boiler feed pump is now on the line in the new Astoria station of the Consolidated Edison Co. of New York.

The De Laval 8/6 pump operates at 129 psig suction pressure and delivers 1,570 gpm of 344 F water against 2,229 discharge pressure. Direct-connected at the end of the boiler feed pump shaft is a De Laval IMO pump for lubrication of the main pump and motor bearings. Also furnished is a motor-driven De Laval IMO auxiliary oil pump with pressure controlled switches.

De Laval barrel type boiler feed pumps meet all the requirements of high pressure, high temperature boiler feed service. The distinctive De Laval design assures years of reliable operation with minimum maintenance.



DE LAVAL *Boiler Feed Pumps*

DE LAVAL STEAM TURBINE COMPANY

861 Nottingham Way, Trenton 2, New Jersey

DL 288

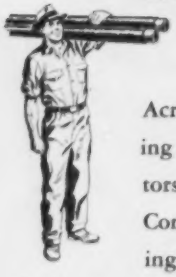
PROTECTION

FOR UNDERGROUND ELECTRICAL CABLES

STANDARD PROTECTION — for football — it's the helmet... for underground cables — it's Orangeburg Fibre Conduit.

NOCRETE for one or two ducts... installed *without* concrete encasement.

STANDARD for three or more ducts ... installed *with* concrete encasement.



Across the country in every city and state, leading Utilities, Municipalities, Electrical Contractors everywhere have made Orangeburg Fibre Conduit a leader, as its wide use convincingly shows.

You gain many advantages when you use Orangeburg. Its impermeable wall and tight joints prevent corrosive ground waters from entering. Its smooth bore and low coefficient of friction safeguard the cables when pulled in . . . also from wear during cable movement. Non-metallic Orangeburg does not corrode — resists acids, alkalies, grease, oil. It is tough, resilient, durable — will not crack or break when properly handled. And the installation cost is low because the lightweight 8-foot lengths are quickly connected by Taper-Sleeve Joints with just a few light taps. Orangeburg is easily sawed to any length — easily tooled with an inexpensive lathe.

For these and other reasons, Orangeburg is logically the leader — a first choice of so many public utilities, municipalities and electrical contractors everywhere.

Write to Dept. EW94 for complete catalog.

ORANGEBURG MANUFACTURING COMPANY, INC.
Orangeburg, New York — *West Coast Plant* — Newark, Calif.

ORANGEBURG®
FIBRE CONDUIT

STANDARD INSTALLED WITH CONCRETE

NOCRETE INSTALLED WITHOUT CONCRETE

GraybaR ELECTRIC COMPANY

DISTRIBUTORS, ORANGEBURG FIBRE CONDUIT

BRANCHES AND STOCKS IN PRINCIPAL CITIES

GENERAL ELECTRIC SUPPLY COMPANY
A DIVISION OF GENERAL ELECTRIC DISTRIBUTING CORPORATION

George W. Cooper, Manager, Protective Equipment Sales, holds L-M's old (left) and new (right) 6 kv valve type arresters, showing the difference in size.

Now L-M Makes Available a Lighter, More Compact Valve Type Arrester

Excellent characteristics remain unchanged in new easy-to-handle design of heavy-duty distribution arrester. Compact new Type E unit provides excellent protection and long life.

Years of experience and advanced study of lightning arrester requirements have led to the development by L-M engineers of a new, more compact valve type arrester. The new Type E is easier to handle and install; it requires less space on cross arms and stockroom shelves. Yet it has all the performance characteristics of the older units.

Precision Spark Gap provides optimum balance between 60-cycle and impulse sparkover characteristics; prevents unnecessary sparkover on harmless switching surges; yet provides instant response to assure full protection against dangerous lightning surges.

L-M's Exclusive Valve Element is molded right into the housing, assuring maximum discharge capacity and minimum IR drop. Exclusive lens-shaped electrodes molded into the element distribute surge currents uniformly throughout the valve material, to further insure high surge capacity and low IR drop.

Pyrex® Glass Housing permits visual inspection to detect mechanical or electrical damage.

Isolator gives positive assurance against grounding feeders. If the arrester should ever become damaged, the Isolator instantly disconnects the ground lead. This is another exclusive L-M feature.

L-M's new Type E arrester is available in 1, 3, 6, 9, 10, 12 and 15 kv ratings.

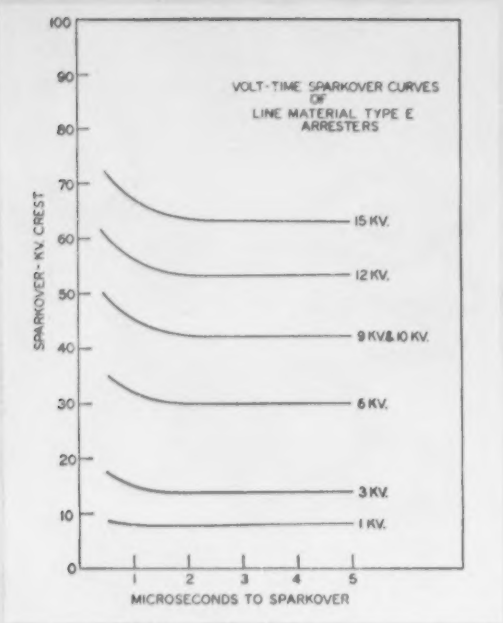
Ask For Complete Information

Ask the L-M Field Engineer for Bulletin LA2 on L-M's Type E arresters, giving specific information on arrester requirements, design, and performance; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

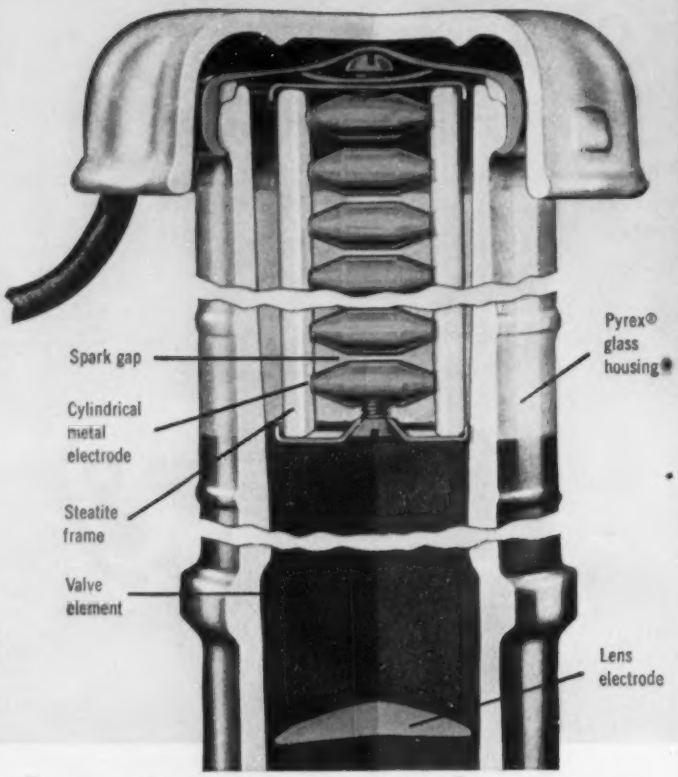
Comparison of Old and New Designs Type E Arresters

Size	Weight		Height (including Isolator)	
kv	Old Lbs.	New Lbs.	Old In.	New In.
1	6.5	6.5	8½	9
3	8.5	6.5	11½	9
6	11.5	9.0	17¼	13½
9	15.0	11.5	22¼	18
10	15.5	12.0	23¼	19⅛
12	16.0	15.5	23¼	22½
15	18.0	18.0	28¼	27

LINE MATERIAL Lightning Arresters



Volt-time curves of arrester sparkover on impulse. These curves illustrate the quick response of the arrester to lightning surges. At all points of the curve the impulse sparkover of the arrester is far below the insulation strength of the distribution equipment being protected.



How L-M's Type E Valve Arrester Balances 60-Cycle Sparkover and Impulse Sparkover

By **GEORGE W. COOPER**
Manager
Protective Equipment Sales
Line Material Company

L-M's Valve Arrester spark gap is designed to prevent unnecessary 60-cycle sparkover of the arrester to harmless switching surges, whereas the low and consistent impulse sparkover brings the arrester into operation quickly and dependably in case of a dangerous lightning surge.

Precision Spark Gap

The spark gap is made of electrode members, accurately spaced and supported by a strong machined frame of high-grade steatite. The gap is so designed that its 60-cycle sparkover value is approximately 1.8 times the rating of the arrester under wet conditions. This is sufficient to keep normal switching surges from sparking over, and provides a path to drain off higher switching and lightning surges.

At higher surge voltages the combination of the metal electrode and the steatite produces an instantaneously ionized, electrically fast path. This combination, together with the cylindrical design of the electrodes, forms a ladder gap unit with a low impulse sparkover.

High Discharge Capacity

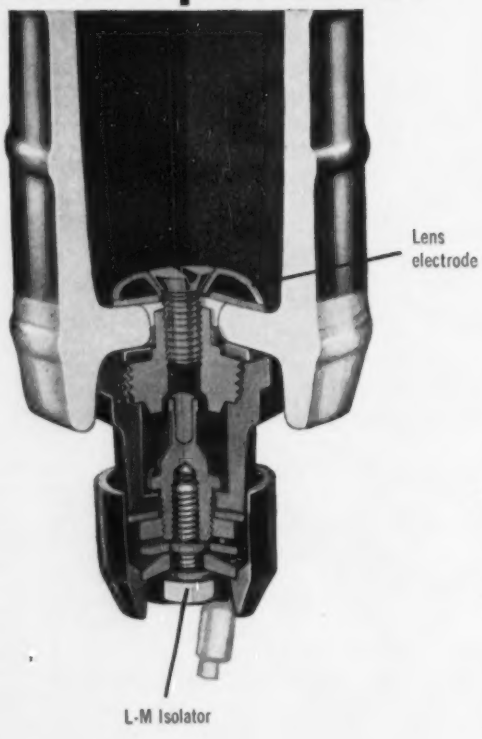
L-M's exclusive bonded valve element combines low IR drop with more than enough capacity to handle the 65,000-ampere surges prescribed by NEMA. It acts as a valve to limit power follow current to a negligible value.

The result of all these features is that the L-M Type E arrester is outstanding in the protection it provides, in its long life under severe lightning conditions, and in its permanent, never-changing characteristics. L-M valve-type arresters amply meet all NEMA standards.

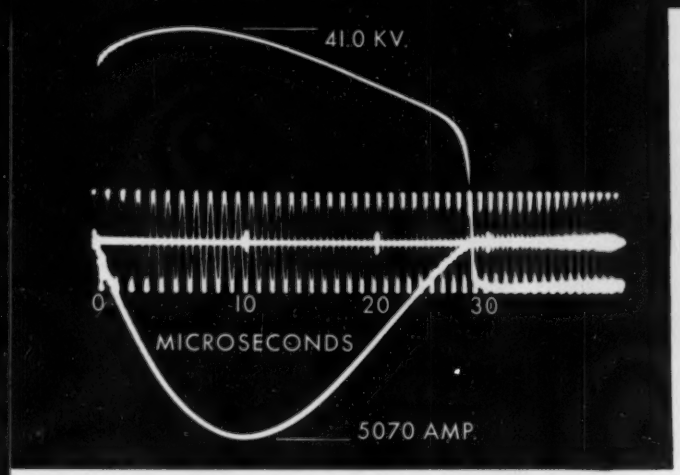
In addition, L-M's "ISOLATOR" provides positive assurance against grounding feeders, by disconnecting the ground lead from the arrester, if the arrester should ever become damaged.

Get This Bulletin

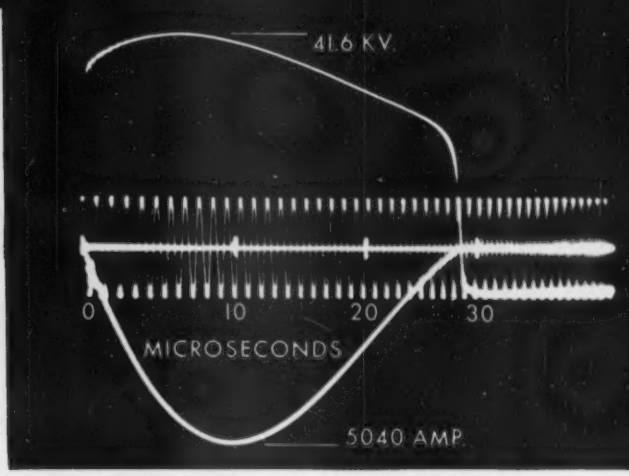
Get the whole story of L-M arrester performance and application. Ask the L-M Field Engineer for a copy of Bulletin LA2; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



LINE MATERIAL *Lightning Arresters*



Before test: Oscillogram illustrates the electrical characteristics of an L-M 9 kv arrester before the AIEE Operating Duty Cycle Test of thirty operations using a 5000 ampere surge and 60-cycle follow current at the rated voltage of the arrester.



After test: Oscillogram of electrical characteristics of the same arrester after AIEE Operating Duty Cycle Test, illustrating the unchanging high degree of protection that is maintained throughout the life of the arrester.

How L-M's Type E Valve Arrester Provides Low IR Drop, High Discharge Capacity

By **GEORGE W. COOPER**
Manager
Protective Equipment Sales
Line Material Company

L-M's exclusive design of valve arresters provides the optimum amount of valve material to give balanced performance. The valve material must provide a low impedance path for surge currents to assure low IR drop, provide ample surge current capacity, and function as a valve to limit follow current until it is interrupted by the series gap.

Several factors contribute to the high discharge capacity or ability of the Type E arrester to handle heavy strokes of lightning without damage.

L-M's Molded-in Valve Element

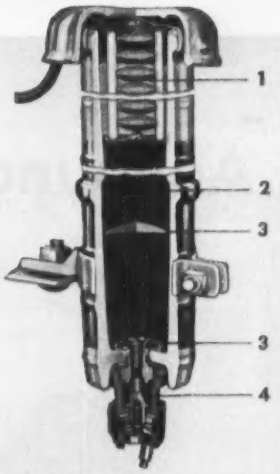
"Granulon," the valve material, was developed as the result of years of experience and research in distribution-type arresters. It is able to withstand severe heating which accompanies heavy strokes of lightning. The "Granulon" is mixed with a special non-charring, inorganic, glass-like binder; then molded directly into the glass housing at high pressure to form a hard, dense mass with outstanding discharge capacity and valve-action properties.

Lens-shaped electrodes are placed in the valve element to counteract the lightning surge current "skin effect." These electrodes have been scientifically designed to produce a multiple-path distribution of the surge current throughout the valve element, thus increasing the discharge capacity of the element and assuring long, uniform life.

Assures High Capacity

The characteristics of L-M's valve element combine optimum performance features with outstanding protection and long arrester life. These characteristics are retained permanently without change caused by aging or service.

In addition, the "Isolator" provides positive assurance against permanent fault to ground by disconnecting the ground lead from the arrester if the arrester should ever become damaged.



1. The ladder spark gap is designed to provide a perfect balance between 60-cycle sparkover and impulse sparkover.

2. "Granulon," the valve material, is able to withstand severe heating which accompanies heavy strokes of lightning.

3. Lens-shaped electrodes in the element counteract "skin effect" of surges, assuring even distribution of the discharge throughout the valve element.

4. L-M's "Isolator" gives positive assurance against grounding feeders by disconnecting the ground lead from the arrester if the arrester should ever become damaged.

Electrical Characteristics of Type E Valve Arrester

KV Rating	Minimum Impulse Sparkover 1½x40 Wave KV Crest	Front of Wave Sparkover KV Crest	IR Drop Across Arrester				
			1500 Ampere Surge	3000 Ampere Surge	5000 Ampere Surge	10,000 Ampere Surge	20,000 Ampere Surge
1	8	8	4 KV	4.5 KV	5 KV	6 KV	7 KV
3	14	17	11 KV	13 KV	14 KV	16 KV	18 KV
6	30	33	22 KV	25 KV	27 KV	31 KV	35 KV
9	42	49	33 KV	37 KV	41 KV	46 KV	53 KV
10	42	49	37 KV	42 KV	46 KV	52 KV	59 KV
12	53	60	44 KV	49 KV	54 KV	60 KV	67 KV
15	63	70	55 KV	62 KV	66 KV	74 KV	85 KV

(On wave rising 100 kv per microsecond per 12 kv arrester rating; 10 kv per microsecond for 1 kv arrester.)

Get the whole story of L-M arrester performance and application. Ask the L-M Field Engineer, or write for a copy of Bulletin LA2, Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

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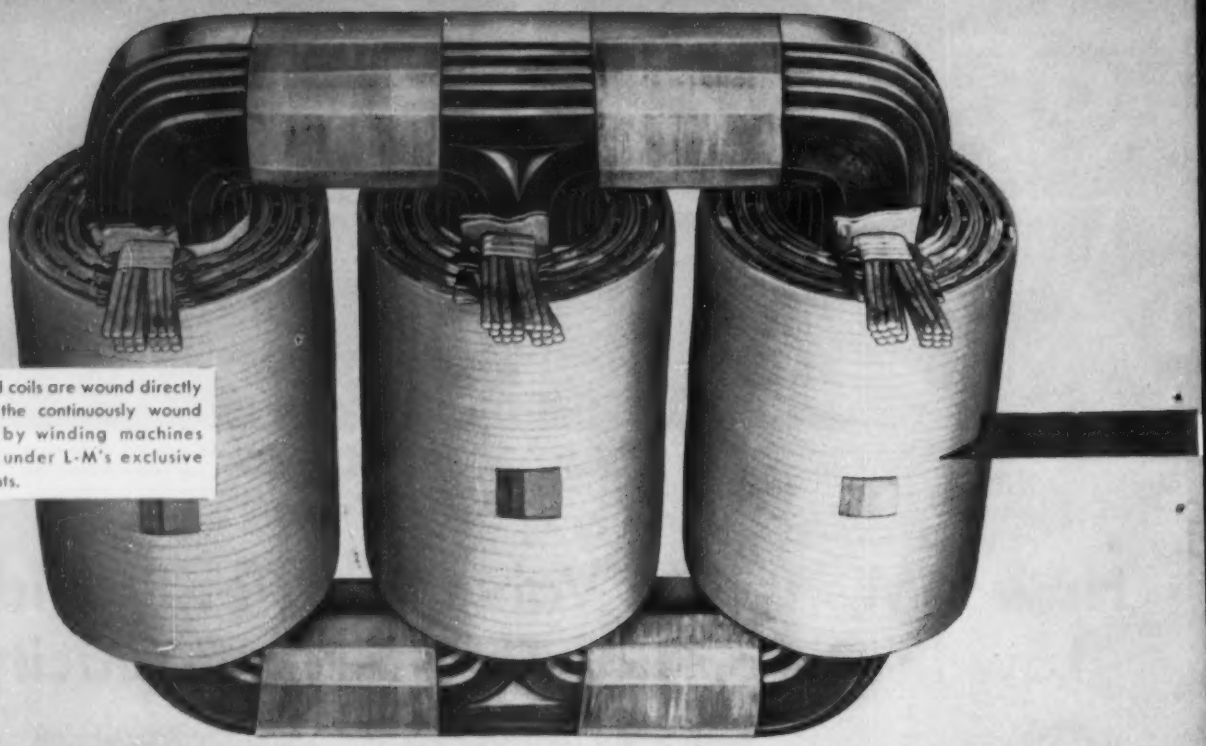
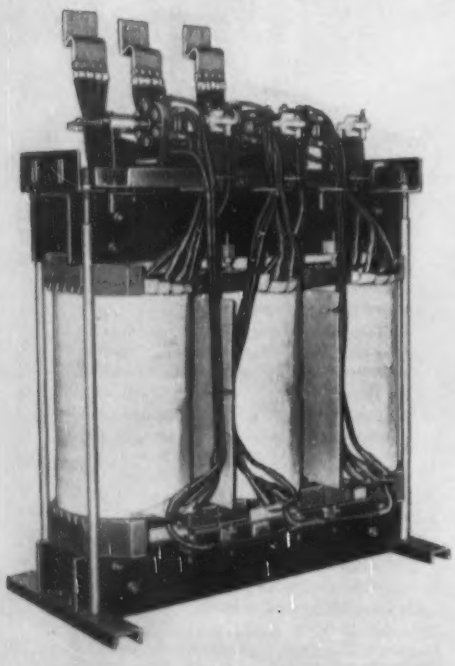
LINE MATERIAL *Lightning Arresters*

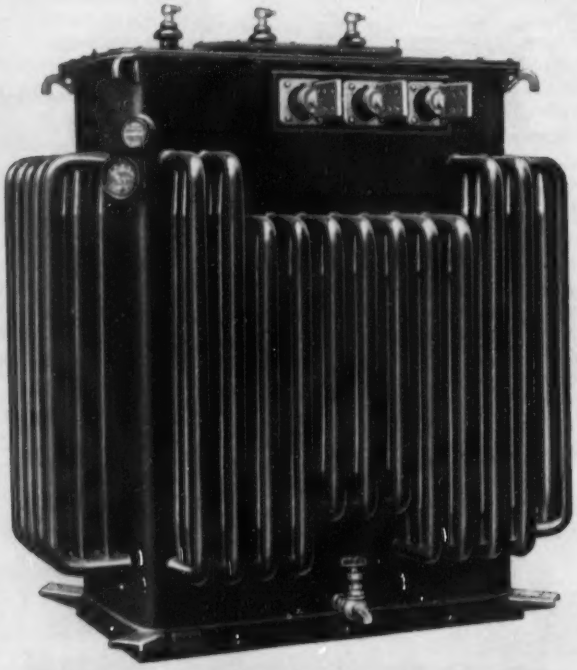


Round coils are wound directly onto the continuously wound core by winding machines built under L-M's exclusive patents.

L-M Announces New Uni-Wound℠ 3-Phase

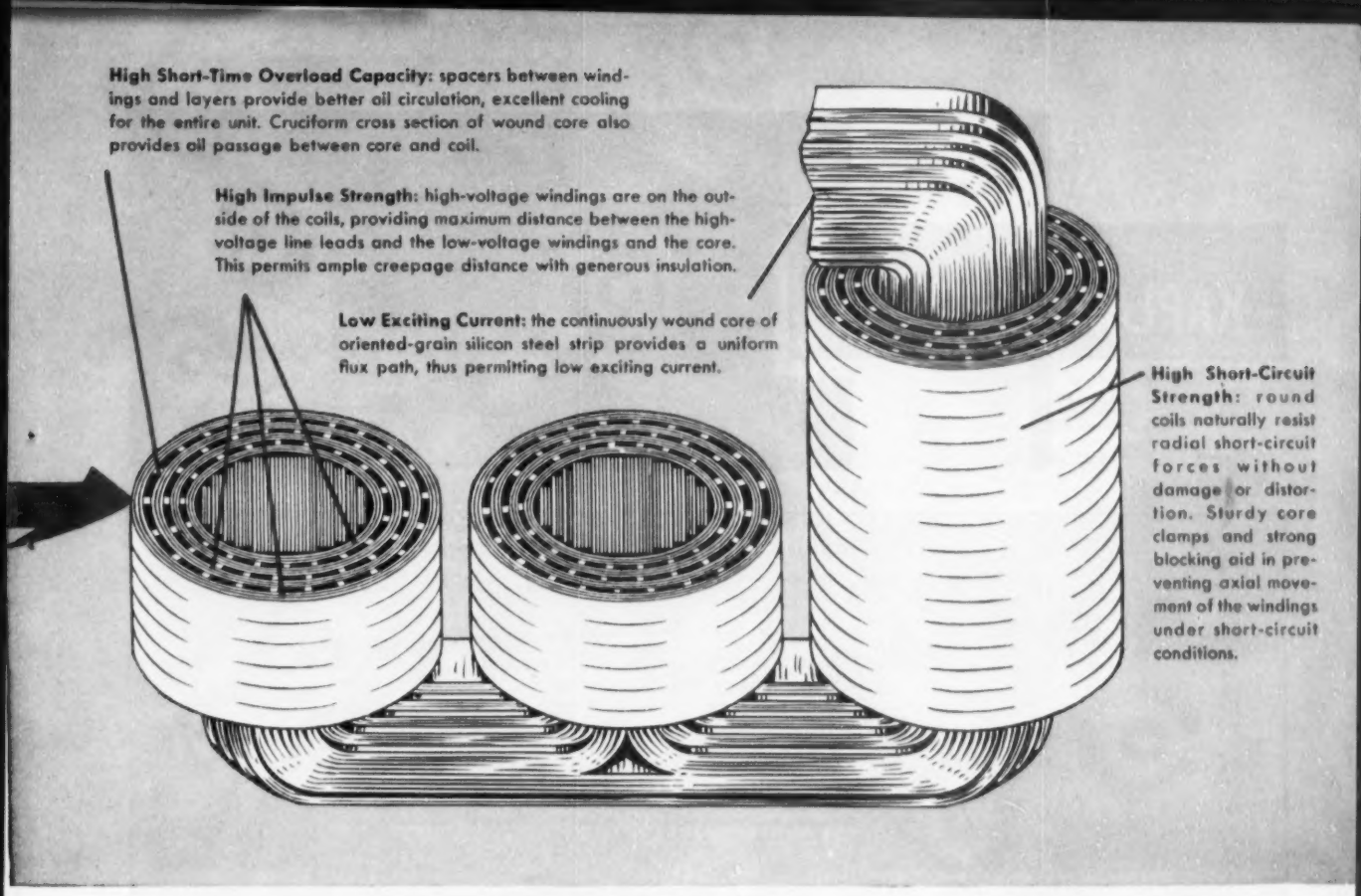


Core-coil assembly for a 500 kva Uni-Wound transformer. The sturdy core clamping frame and strong blocking contribute to high short-circuit strength.



Completed 500 kva Uni-Wound 3-phase transformer. The unit is smaller, shorter, and lighter than L-M's previous type. The transformer provides all the well-known advantages of L-M's single-phase Round-Wound transformers.

"Uni-Wound" and "Tri-Wound" are Line Material Company trade-marks.


High Short-Time Overload Capacity: spacers between windings and layers provide better oil circulation, excellent cooling for the entire unit. Cruciform cross section of wound core also provides oil passage between core and coil.
High Impulse Strength: high-voltage windings are on the outside of the coils, providing maximum distance between the high-voltage line leads and the low-voltage windings and the core. This permits ample creepage distance with generous insulation.
Low Exciting Current: the continuously wound core of oriented-grain silicon steel strip provides a uniform flux path, thus permitting low exciting current.
High Short-Circuit Strength: round coils naturally resist radial short-circuit forces without damage or distortion. Sturdy core clamps and strong blocking aid in preventing axial movement of the windings under short-circuit conditions.

Transformers in 112½ to 500 kva Sizes

Provides advantages of L-M Round-Wound® core construction in 3-phase transformers in sizes from 112½ through 500 kva. They're lighter, smaller, have improved overload capacity, high impulse level, high short-circuit strength.

By **ALVIN B. COYLE**
Manager,
Transformer Sales
Line Material Company

L-M Round-Wound construction consists of a continuously wound core, with round coils wound directly onto the core. This design has a number of advantages in improved performance and better mechanical strength.

Uni-Wound Fills Need

Now L-M engineers have developed a 3-phase transformer with all the advantages of Round-Wound construction. This is the new *Uni-Wound* transformer, which is now in production in sizes from 112½ through 500 kva, and in voltages through 13,800. In smaller 3-phase sizes L-M offers the new *Tri-Wound* transformer.

Continuously Wound Core

The Uni-Wound transformer consists of a unitary core, continuously wound of oriented-grain silicon steel strip. The bare core is annealed after winding. Then round coils are wound directly onto the three core legs by L-M's exclusive winding process.

All Other Round-Wound Advantages

Thus all of the inherent characteristics of the single-phase Round-Wound transformer are provided in the 3-phase Uni-Wound. These advantages include:

high short-time overload capacity
uniformly high impulse strength
high short-circuit strength
low exciting current
lighter weight • smaller size

Uni-Wound Lighter, Lower

The 500 kva Uni-Wound is about 1200 pounds lighter than the stacked lamination type. The 112½ kva, 2400 volt delta Uni-Wound is about 400 pounds lighter than the 112½ kva Triplex style. These lighter weights permit single-pole mounting of sizes through 150 kva instead of the 2-pole platform construction previously required. In some sizes, the over-all height has been reduced as much as two feet, with but little increase in projected floor space.

Balanced Performance

Both the physical and performance characteristics have been well balanced in the Uni-Wound 3-phase transformer design. Just as with the single-phase Round-Wound, no one characteristic has been emphasized at the expense of another. No one characteristic has been considered exclusively by itself, but only in its relationship to the over-all performance of the transformer.

Get Details on Uni-Wound Transformers

Ask the L-M Field Engineer to give you full details; or write Line Material Company, Transformer Division, Zanesville, Ohio. (Line Material Company is a McGraw Electric Company Division.)

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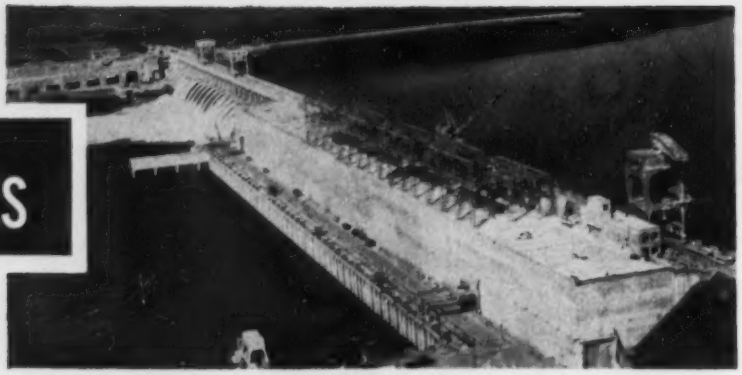
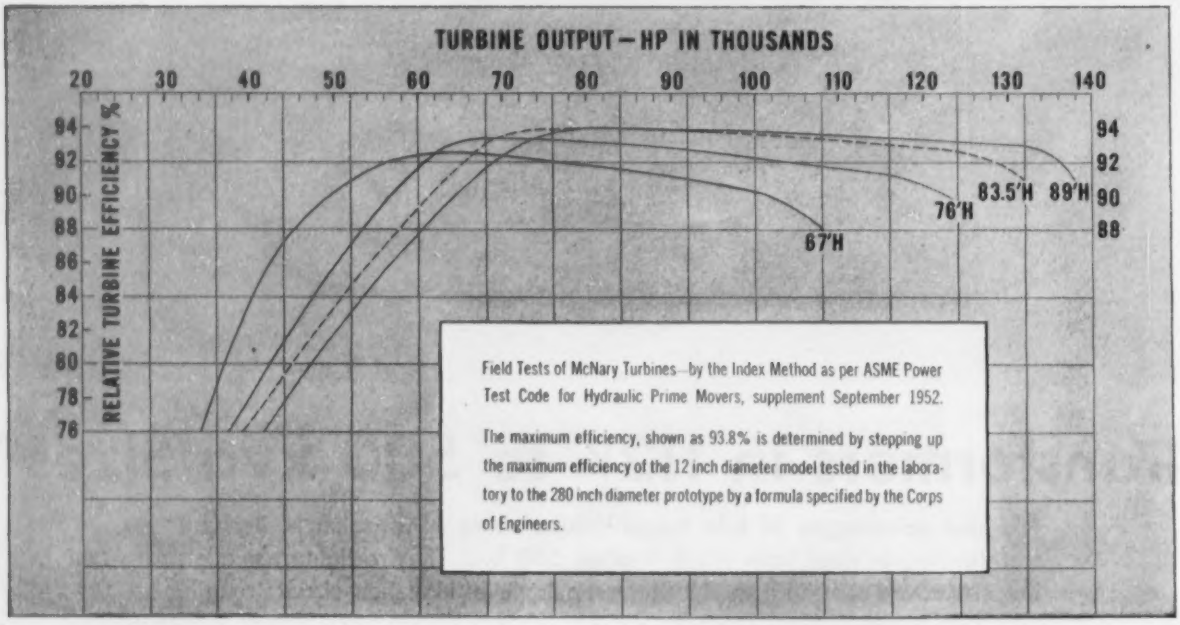
LM® LINE MATERIAL Transformers

SMS

KAPLAN TURBINES




TURBINE OUTPUT—HP IN THOUSANDS
20 30 40 50 60 70 80 90 100 110 120 130 140
RELATIVE TURBINE EFFICIENCY %
94 92 90 88 86 84 82 80 78 76
94 92 90 88
83.5'H
89'H
76'H
67'H
Field Tests of McNary Turbines—by the Index Method as per ASME Power Test Code for Hydraulic Prime Movers, supplement September 1952.
The maximum efficiency, shown as 93.8% is determined by stepping up the maximum efficiency of the 12 inch diameter model tested in the laboratory to the 280 inch diameter prototype by a formula specified by the Corps of Engineers.

SMS-KAPLAN TURBINES AT McNARY DEVELOP 138,000 HP

Field test performance of SMS-Kaplan turbines already in operation at McNary Dam prove them to be the highest powered adjustable blade propeller units in the world.

From the laboratory model to the prototype unit, the outstanding performance of these turbines is a typical result of the specialized research, engineering experience and productive capacity that is ready to serve you at S. Morgan Smith Company. Write to us at York, Pennsylvania, for full information on hydraulic turbines or valves, gates, hoists and other accessories.

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Pumps
Gates & Hoists
Trash Rakes
Accessories

HYDRODYNAMICS

Rotovalves
Ball Valves
Butterfly Valves
Free-Discharge Valves
Controllable-Pitch Ship Propellers

S. MORGAN SMITH CO.

Reduced Maintenance
Improved Reliability

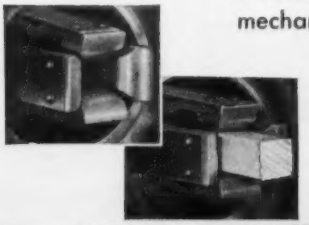
PACIFIC ELECTRIC
Type RHE
CIRCUIT BREAKERS

115, 138, 161 kv — 3 or 5 cycles
196/230 and 230 kv — 3 cycles
to 10,000,000 int. kva (ASA)
at 161 and 230 kv
(Also other types, 7.5 kv and up)

Electrically and Mechanically Trip Free
ASA, AIEE, and NEMA STANDARD

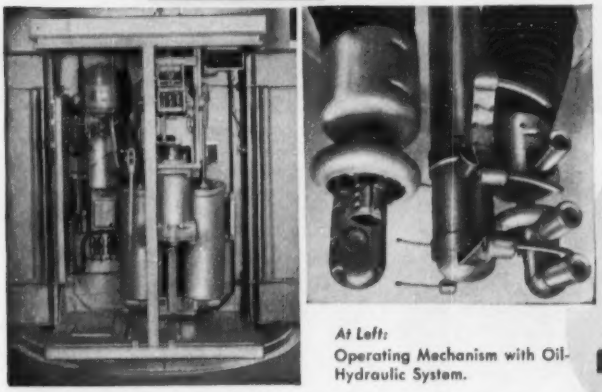
Applicable Standards of ASA, AIEE, and NEMA assure electrical performance of any breaker that meets such requirements . . . but *mechanical* construction, upon which maintenance cost and reliability largely depend, still remains subject to the manufacturer's design approach.

Pocific Electric solicits critical examination of its Type RHE breakers from both the electrical and mechanical standpoints.



At Left:
Sliding Shoe (finger) Contacts — Six Such Groups in Each Breaker (shown open and closed).

Below:
One-Piece Moving Contact Structure and Interrupters.



At Left:
Operating Mechanism with Oil-Hydraulic System.

Above:
Type RHE-64, 115 kv Circuit Breaker with Common-Base Mounting.

PACIFIC TYPE RHE Breakers embody mechanical features that contribute to low maintenance cost and improved reliability of the breaker and the substation at which it is located. These features assume increasing importance as the upward trend of wages and service salaries continues.

Only One Moving Element in the Tank—Opening accelerating springs and shock absorbers are outside of the tank. As no parts in the tank require service adjustment, maintenance within the tank is largely eliminated. Entrance bushings are under negligible mechanical stress.

Nested Sliding Shoe (finger) Contacts—Self-cleaning; arc foot-points confined to portions of surfaces that do not carry load current; minimizes contact dressing.

Oil-Hydraulic Restoration of Closing Energy—Simple; reliable. Full energy restoration in ten seconds by conventional oil-hydraulic components that also embody provision for decelerating the closing stroke.

Anti-Friction Bearings—Sealed and lubricated at time of assembly, require no further attention. Lubrication points practically eliminated.

Easy Manual Operation for Load Switching—If control power is lost, the breaker may be closed manually. Then two minutes' hand operation of the oil pump prepares the mechanism for O-C-O after fault, or for manual closing after manual opening—all at rated speeds.

These and other advanced features are described in Catalog 585.

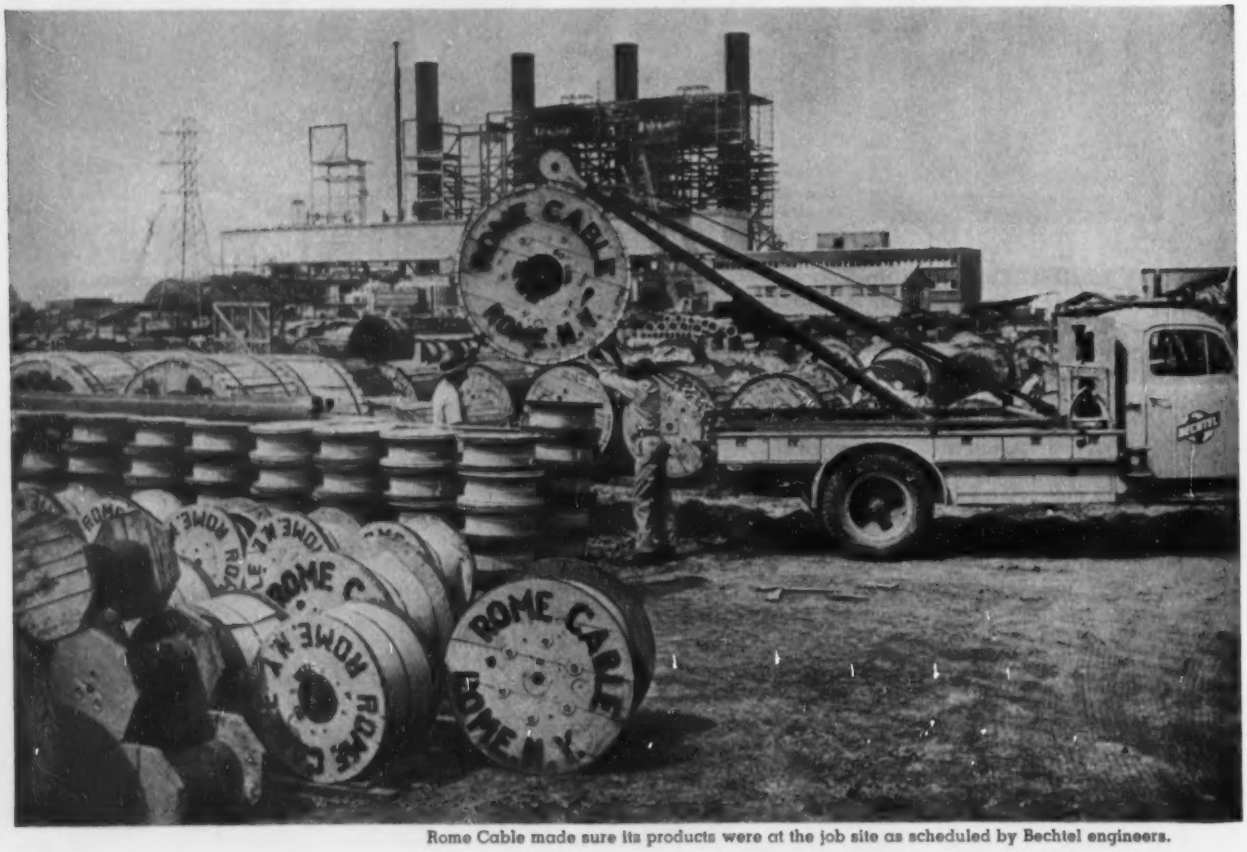
Since 1906

SALES OFFICES or AGENCIES
in PRINCIPAL CITIES

PACIFIC ELECTRIC SWITCHGEAR DIVISION
FEDERAL PACIFIC ELECTRIC CO.

5815 THIRD STREET • SAN FRANCISCO 24 • CALIFORNIA

This 600,000 KW plant of the P.G.&E. Co. now nearing completion at Pittsburg, Calif., will be the largest steam generating plant west of the Mississippi.



Rome Cable made sure its products were at the job site as scheduled by Bechtel engineers.

aids operation of the West's big new power plant at Pittsburg, California

Building ahead of demand to satisfy all requirements for power in the thriving Northern and Central California regions, this new 600,000 KW power plant nearing completion at Pittsburg, California, is another milestone in the $1½ billion postwar construction program of the Pacific Gas and Electric Company.

It's the biggest in the West—an $80,000,000 project.

Engineered and constructed to give adequate, uninterrupted power to this important region, only the most reliable materials and equipment would do. Engineers of P.G.&E. and Bechtel Corporation, Engineering and Construction Contractors on the project, approved Rome power and control cables. Previous experience with Rome cables had been gained in the building of the Contra Costa Steam Plant and other P.G.&E. plants and stations.

Aluminum Power Cables

Miles of Rome "RoZone-RoPrene" aluminum 5KV and 600 volt auxiliary power cables and copper control cables have gone into this new Pittsburg Station.

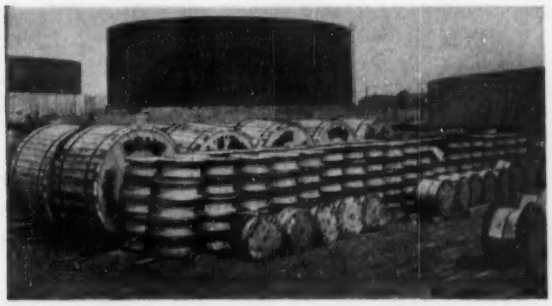
Cables with ozone-resistant insulation and neoprene sheaths were specified for this installation. RoZone is the ozone-resistant oil-base insulation developed in the Rome Cable laboratories for long service under severe conditions. It has excellent electrical properties, and exceptional stability in water. It shows remarkable resistance to ozone, moisture, and heat. Its dielectric strength exceeds 400 volts per mil.

RoPrene is the tough Neoprene sheath that protects these cables so effectively against abrasion and other mechanical damage, and that makes them so easy to pull into ducts and conduits.

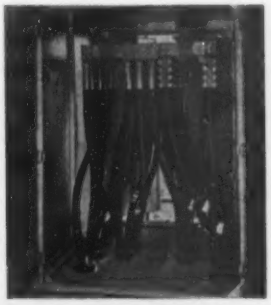
Ionization Level Tested

Every foot of Rome power cable rated at 3000 volts or over is subjected to ionization testing as a standard control procedure. In this non-destructive test, devised by Rome Cable engineers, the corona level of the entire cable is measured to make sure that the ionization voltage exceeds the intended operating voltage of the cable. This assures dependable service and long life, with correspondingly lower maintenance costs.

You can have the same assurance of quality and service, by specifying Rome cables. Write today for your copy of the Rome Power and Control Cable Catalog.



Approximately 37 miles of Rome copper control cables, and 12 miles of Rome aluminum power cables are among the products being used at Pittsburg plant.



One of the junction boxes at the Pittsburg plant, showing terminals of cables to busses.

ROME CABLE Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA

ROME CABLE ROME, N.Y.

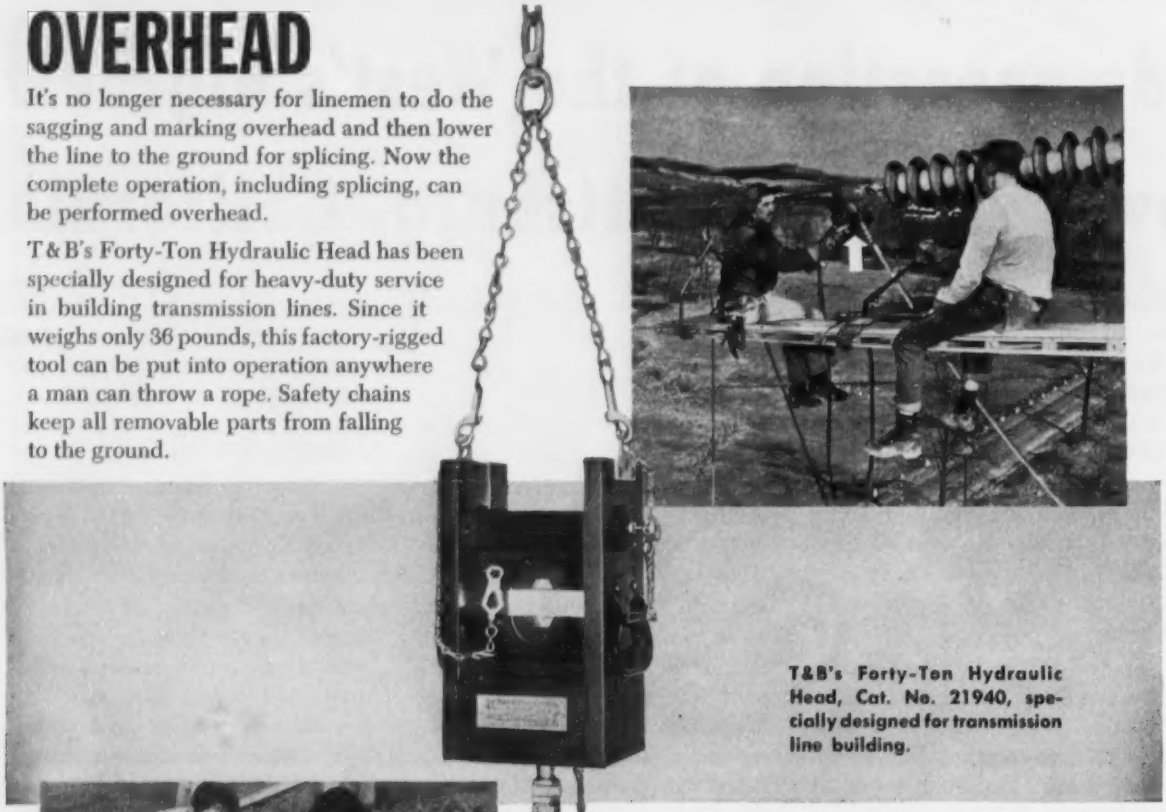
It Costs Less to Buy the Best

Now *ONE* portable tool makes transmission line splices

OVERHEAD

It's no longer necessary for linemen to do the sagging and marking overhead and then lower the line to the ground for splicing. Now the complete operation, including splicing, can be performed overhead.

T & B's Forty-Ton Hydraulic Head has been specially designed for heavy-duty service in building transmission lines. Since it weighs only 36 pounds, this factory-rigged tool can be put into operation anywhere a man can throw a rope. Safety chains keep all removable parts from falling to the ground.



T&B's Forty-Ton Hydraulic Head, Cat. No. 21940, specially designed for transmission line building.

or ON THE GROUND

Demountable legs hold T & B's Forty-Ton Hydraulic Head at convenient working height when installations are being made on the ground. During operation, hardened steel dies compress fitting and cable hexagonally into one homogeneous mass . . . all in a few seconds. The same die set installs tension splicers, dead ends, loop splicers and taps, tees and terminals.

Modern hydraulic design has virtually eliminated the need for maintenance. However, field maintenance is simple and practical. The 21940 Installing Head can be completely disassembled and reassembled in less than one-half hour with these common tools: screw driver, Allen wrench, and mallet.

T&B Bulletin 70 gives a detailed description of the Forty-Ton Hydraulic Head as well as complete lines of T&B connectors, tools, and accessories for transmission line building. Send for FREE copy.

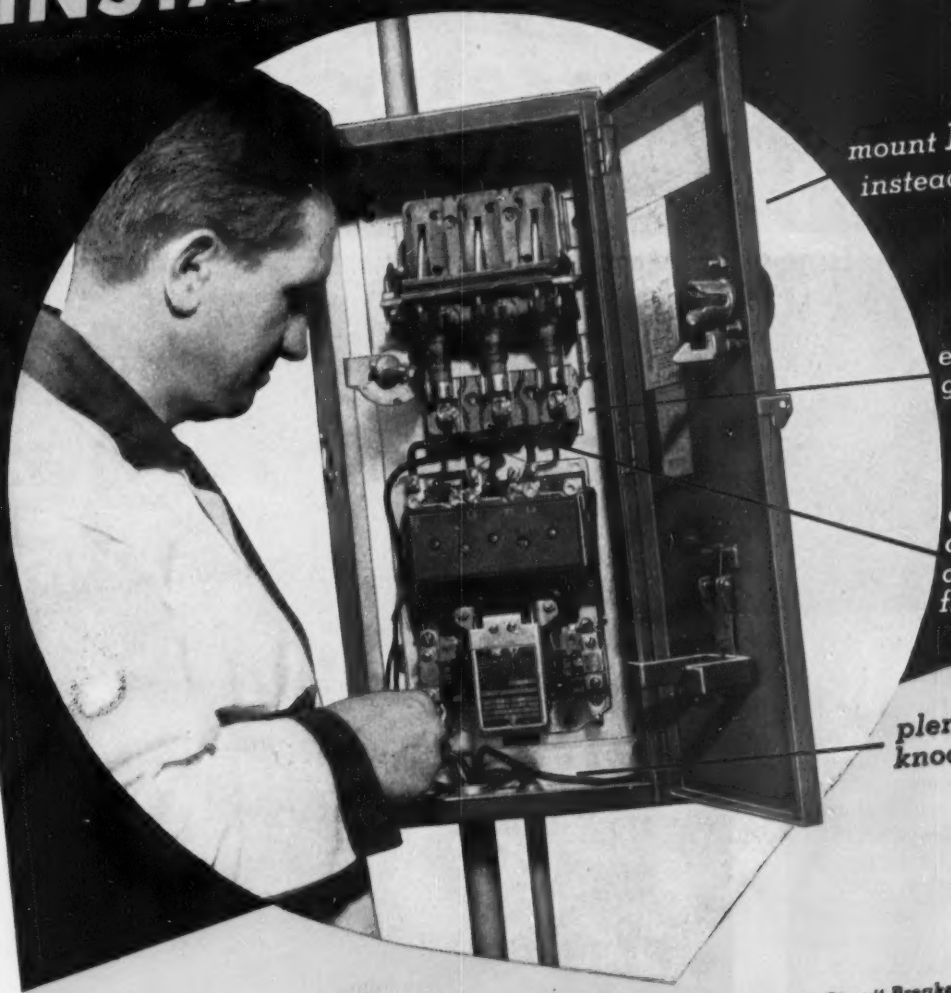
LOOK FOR THIS SIGN —

IT'S THE MARK OF AN AUTHORIZED T & B DISTRIBUTOR

The complete line of T & B fittings for conductors and raceways is sold only by recognized electrical wholesalers. It's our way of assuring you the service and savings of a friendly local source. Call him for all your electrical needs. T-418

THE THOMAS & BETTS CO.
INCORPORATED
14 Butler Street • Elizabeth 1, New Jersey
Thomas & Betts Ltd., Montreal, P.Q., Canada
MANUFACTURERS OF FINE ELECTRICAL FITTINGS SINCE 1898

EASIER TO INSTALL AND MAINTAIN!



mount 1 device instead of 2

extra-wide gutters

all components accessible from front

plenty of knockouts

SQUARE D COMBINATION STARTERS

(Switch or Circuit Breaker Types)

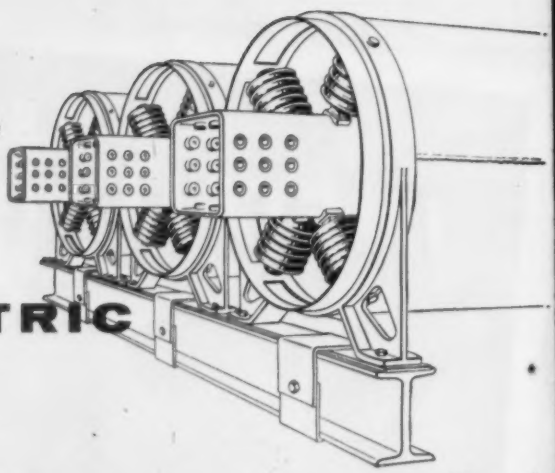
Save space and time. Mount and wire one device instead of two . . . neater, more attractive installations.

Write **for Bulletins 8538 and 8539**
Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

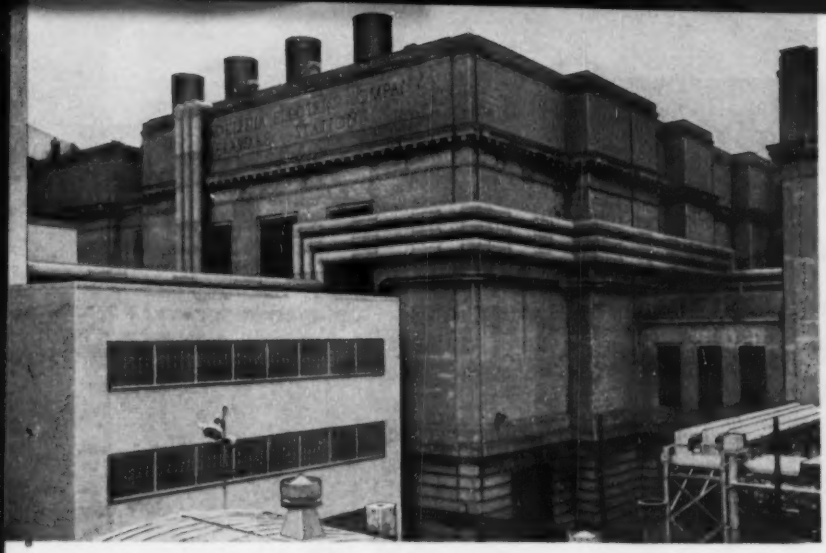
Power on the move at PHILADELPHIA ELECTRIC



The unprecedented growth of the Delaware Valley is creating huge demands for power—for industry, for homes, for commerce. The sale of electricity, which already has multiplied ten-fold since 1920, is climbing toward a further 50 percent increase before 1960!

As big industry develops and expands, electric power companies have to plan far in advance to be able to supply power for increased requirements. Philadelphia Electric Company is well prepared to meet today's power needs, as well as those in the foreseeable future. A million dollars a week is being spent to provide an undiminished supply of electric power for "the world's greatest industrial area."

Typical of Philadelphia Electric Company's "power for progress" is the modernization and expansion of the vital Delaware Station. PE has made extensive use in this station of I-T-E Isolated Phase Bus.



COMPLETED INSTALLATION showing Isolated Phase Bus running along outside walls and over the roofs. Sections are designed for long, straight runs—or to fit small, cramped quarters—for both inside and outside installation.

DURING INSTALLATION prefabricated sections were delivered to site completely assembled . . . ready to fit in place.

All power generated at *Delaware Station* now feeds through Isolated Phase Bus

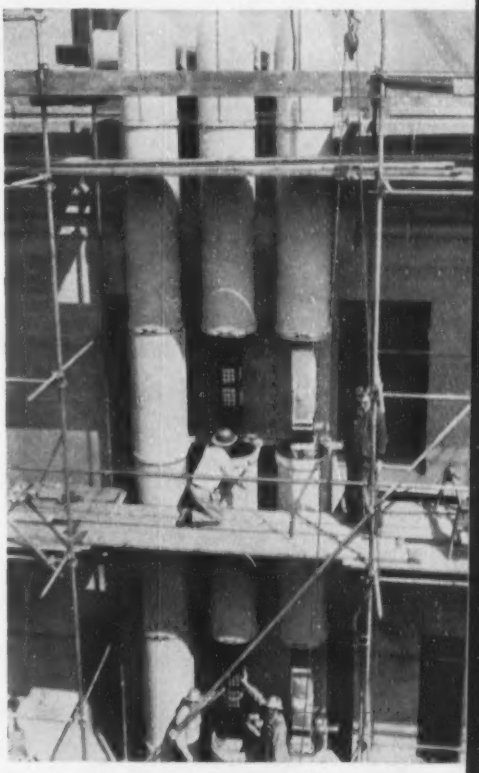
Throughout the station are more than 8700 single-phase feet of I-T-E Isolated Phase Bus. The installation includes long, straight outdoor runs utilizing large assembled units—and short lengths in cramped indoor locations where small pieces are necessary.

In planning the modernization and expansion of Delaware Station, Philadelphia Electric Company engineers decided on the use of I-T-E Isolated Phase Bus because of the following advantages:

Construction is sturdy and compact
Phase-to-phase faults are eliminated
Ground bus can carry a phase-to-ground fault
Porcelain is used to best advantage (in compression only)
High degree of safety afforded to operating personnel
Ease and flexibility of installation cut costs
Minimum maintenance is required

From the start, I-T-E Application Engineers worked in close cooperation with Philadelphia Electric Company engineers. I-T-E prepared comparative estimates, and suggested ways to utilize basic assemblies—thus minimizing investment and delivery time. Factory-matched and -assembled lengths, easily adaptable to both the old and new construction, were delivered *on time*, ready for installation.

For details contact the I-T-E Field Office nearest you. Look in your classified directory under "Electric Equipment."



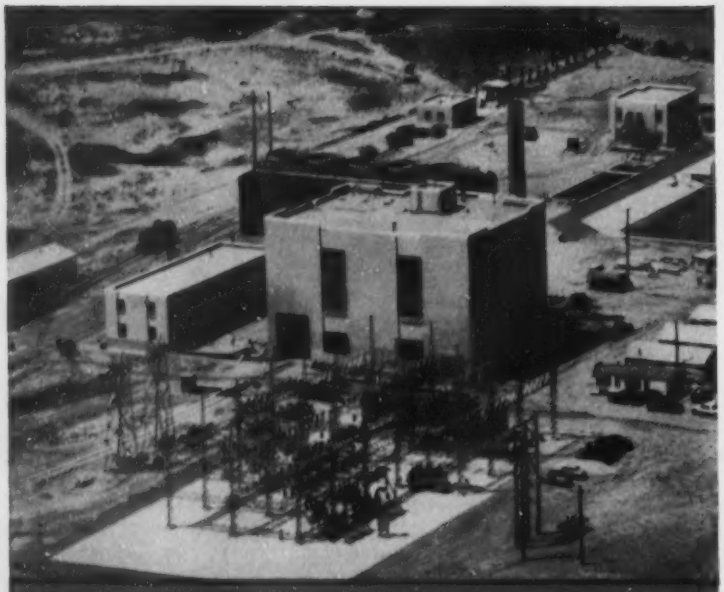
FACTORY-MATCHED SECTIONS are erected to follow building contours. Conductor connections are made. Alternate welded covers and minimum gasketing assure a tight assembly . . . save erection time.

THE SYMBOL OF QUALITY SWITCHGEAR

I-T-E CIRCUIT BREAKER COMPANY

19TH AND HAMILTON STREETS, PHILADELPHIA 30, PA.

ISOLATED PHASE BUS



The Laredo Steam Plant located on the Rio Grande. Across the river is Old Mexico.

POWER TO SPARE...

Laredo Power Station of Central Power & Light Co.

Exide-Manchex

BATTERIES

Laredo's bank of 60 EME-25 Exide-Manchex batteries

Contributing to the industrial, commercial and agricultural development of South Texas is the new Laredo power station. It's another forward step for Central Power and Light Company, whose policy is to locate its power plants at the load centers and to maintain a well-balanced system throughout South Texas. The big generating unit can produce 33,000 kilowatts, or enough electrical power to serve a city 3 times the size of Laredo. Switchgear at the Laredo plant is operated by a bank of 60 EME-25 Exide-Manchex batteries.

Exide-Manchex batteries are reliable; they assure:

POSITIVE OPERATION: Dependable performance at ample voltage avoids switchgear operational failures.

INSTANTANEOUS POWER: High rates for switchgear and valve operation with adequate reserve power for all other control circuits and for emergency lighting.

LOW OPERATING COST: Extremely low internal resistance.

LOW MAINTENANCE COSTS: Water required about twice a year. No change of chemical solution during life of battery.

LOW DEPRECIATION: Sturdy, long-life construction.

GREATER CAPACITY in a given amount of space avoids overcrowding.

• • •

Various sizes and types of Exide Batteries are available in plastic containers.

Exide-Manchex is your best battery buy for all control and substation services.

Exide INDUSTRIAL DIVISION

The Electric Storage Battery Company
Philadelphia 2

1888

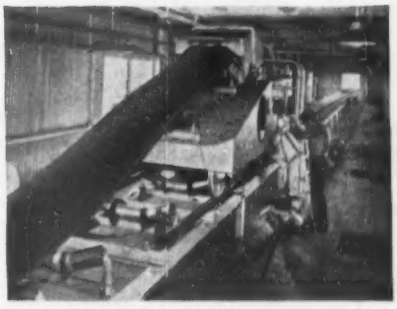
DEPENDABLE BATTERIES FOR 66 YEARS

1954

General View of Green River Power Station
Kentucky Utilities Company
Sargent & Lundy
Consulting Engineers

Bartlett-Snow coal handling at Green River

● The illustration above shows the first 60,000 KW unit of a plant that is to be enlarged into a 180,000 KW station. The coal handling equipment which was built, and installed, by us to Sargent & Lundy specifications, includes track hopper; duplex feeder; belt conveyors of 300 ton capacity; surge hopper for the storing out conveyor; crusher, weightometer, and sampling; inexpensive open galleries with hinged covers to protect the belt from the weather; and our newest design of motorized travelling tripper equipped to insure dust-free operation. For maximum efficiency and fixed unit responsibility, let the Bartlett-Snow coal handling engineers handle your next job.



Discharge Chutes of this Bartlett-Snow Motorized Travelling Tripper are Fitted with Plows and Rollers that Open and Replace the Bunker Seal Assuring Dust-Free Operation

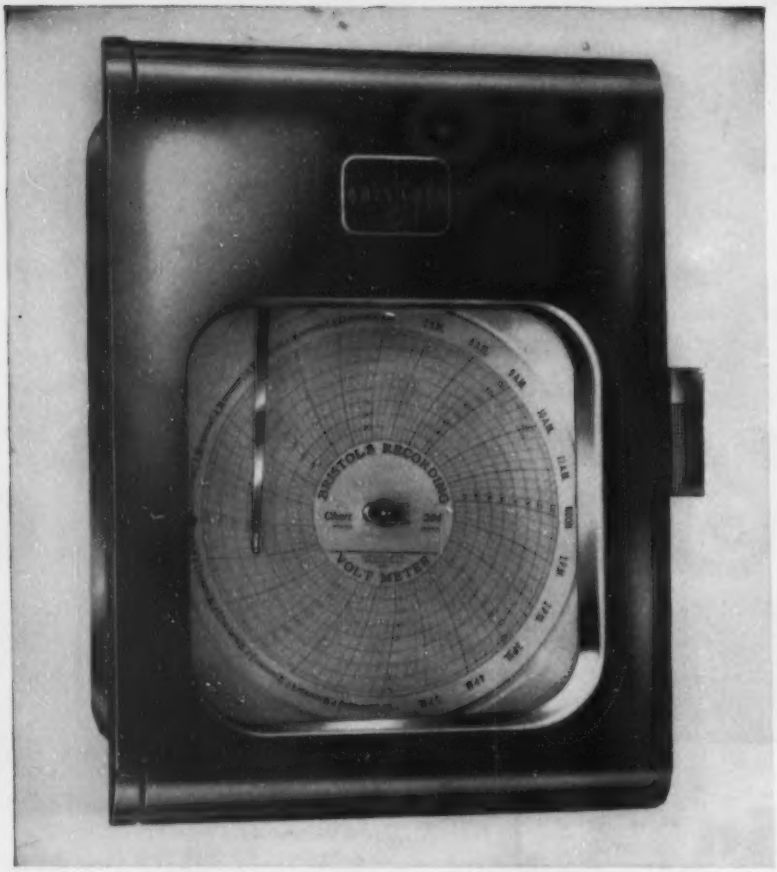
View of Open Belt Conveyor Gallery. Protecting Hoods are Hinged on One Side and can be Latched in Either Open or Closed Position

DESIGNERS ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS ERECTORS

"Builders of Equipment for People You Know"



NEW, EASY-TO-READ BRISTOL RECORDING VOLTMETERS AND AMMETERS are available for permanent mounting or for use as portable instruments.

You'll get greater accuracy, greater dependability with Bristol recording voltmeters and ammeters

Here's why:

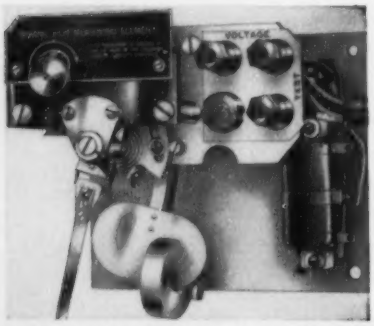
1. Low electrical burden – the lowest burden of any round-chart recorder on the market.
2. Extremely high torque gradient.
3. Temperature compensation.
4. Shock-proof measuring mechanism mounting.
5. Leveling of instrument not critical.
6. Continuously legible recording of sudden changes – up to full scale value.

These modern units are designed for easy use, with dust- and moisture-proof die-cast aluminum case; quick-set chart hub for easy chart changing; non-obscuring pen lifter; and snap-on chart plate.

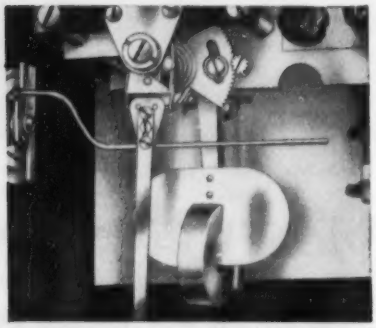
Get the whole story on these precision instruments. Write today for free 28-page Bulletin E1111 to THE BRISTOL COMPANY, 116 Bristol Road, Waterbury 20, Conn.

Many ranges carried in stock for immediate delivery

LOOK AT THESE FEATURES!



NEW MEASURING MECHANISM – High-quality, accurate, dependable Bristol moving-iron mechanism used in all models.



MAGNETIC DAMPING – all models equipped with aluminum vane and alnico magnet damper which gives maximum speed of response possible with minimum overshoot.

PEN MOUNTING – Pen-arm mounting shaft firmly supported at both ends – eliminates trouble from back-lash and lost motion. Pen arm is readily removed and replaced.

BRISTOL

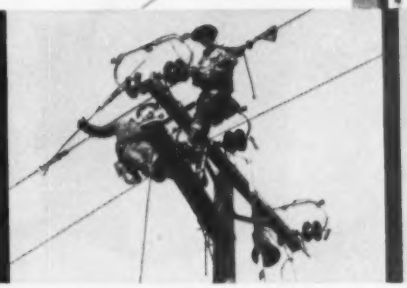
POINTS THE WAY IN HUMAN-ENGINEERED INSTRUMENTATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

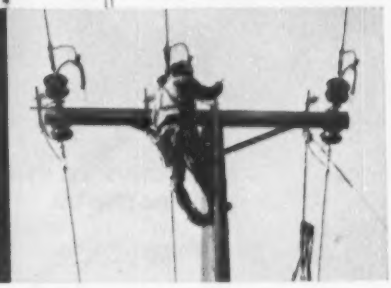
KPF AIR BREAK SWITCHES

1 Sturdy factory-assembled phase units are bolted to cross-arm and push-pull interphase control rods installed on the ground. (Installation is equally simple in the air on installed cross-arms.)

2 At pole top, linemen receive switch bolted to cross-arm and ready to install on pole. Simple design and use of quality materials means KPF phase units are rugged, yet amazingly light weight.



3 Cross-arm bolted to pole, braces and first section of control rod installed. Linemen connect conductors quickly and easily to any standard strain clamp and dead-end direct to phase units.



4 Conductors connected, crank arm being adjusted on push-pull interphase control rod. Like KPF switches and Quick-Breaks, KPF controls need no lubricating. They crack off any icing, are never affected by cross-arm warpage.

Time-tested KPF switches install simply, easily—in 1/2 normal time

KPF switches—the switches that look different because they *are* different—install differently, too. Experience of leading Western power companies shows that KPF switches are normally installed in ½ the time required for complex, cumbersome ordinary equipment. Each KPF phase unit is light weight, readily handled by one man. No extra cross-arms or special supporting structures are needed. Each phase unit is fully assembled, tested and adjusted at the factory. The unit is ready to operate when it reaches the job—no waste of lineman's time. Dependable KPF switches may be mounted horizontally, vertically or triangularly with equal success and long-term, trouble-free service.

For the world's simplest, surest, lowest cost air break switch, specify KPF—standard for nearly 50 years.

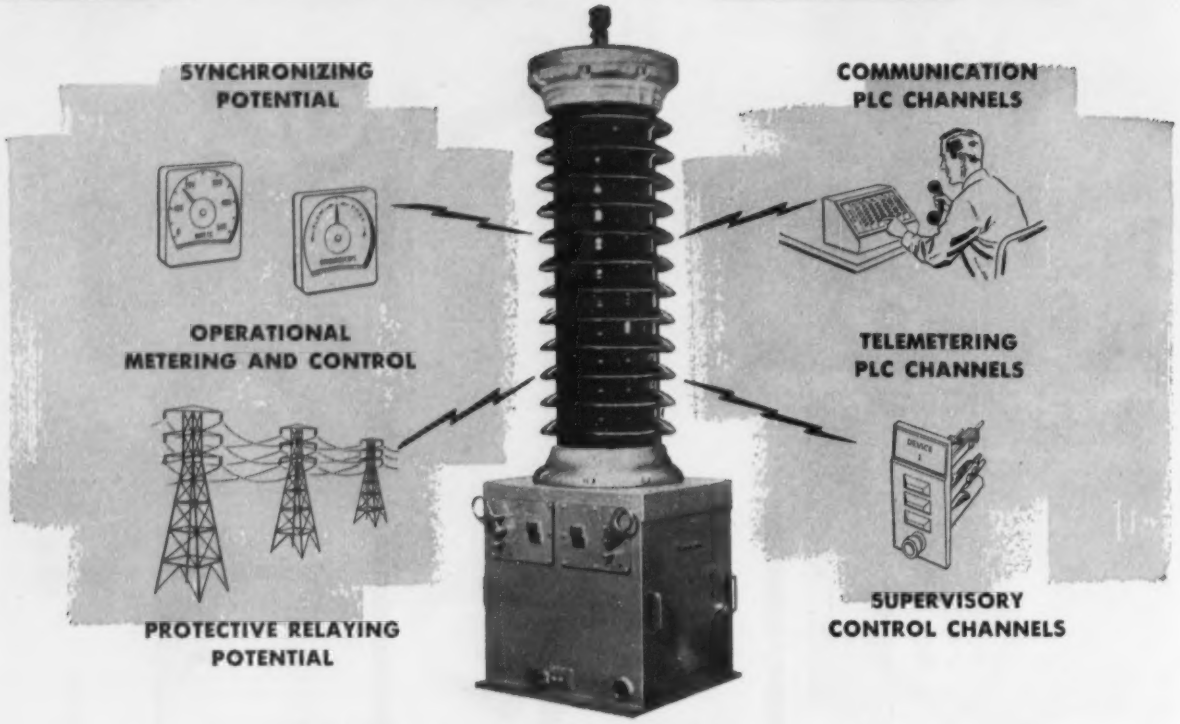
KPF
AIR BREAK SWITCHES
Standard for nearly half a century

New catalog gives complete specifications, detail drawings, installation data.

5 Installation complete. Lineman installs operating lever and last section of control rod. Note the neat, clean pole top appearance of KPF switches—a familiar sight throughout the West on such famous systems as PG&E, Southern California Edison and others.

KPF ELECTRIC COMPANY
1624 East Alpine Avenue, Dept. E, Stockton 5, California

MORE CHANNELS AT LOWER COST



350% Greater Capacitance with

Motorola Aperiodic Coupler

(couples entire carrier spectrum with no tuning)

All of your carrier channels coupled and by-passed with one simple self contained unit—made possible by the utilization of 350% greater capacitance than in old-fashioned coupling capacitors.

Available in the same single base housing is an associated potential device complete with adjusting panel which may be used for operational metering, protective relaying, and synchronizing applications. If desired the adjusting panel may be installed at a remote location.

Suitable for either pedestal or suspension mounting, Motorola Aperiodic Coupling units are available in standard insulation classes . . . from 15 to 345 KV. They are designed to connect many power line carrier transmitters and receivers to a power transmission line and are essentially broad band filters capable of efficiently passing all signals in the power line carrier frequency band from 50 kc. to 200 kc.

Motorola Aperiodic Coupling units are in service in the largest utilities in the world. A partial list of users includes:

American Gas & Electric	Bonneville Power Adm. (U.S.D.I.)
Central P. & L. Co.	Bureau of Reclamation (U.S.D.I.)
Idaho Power Co.	Brazos Electric P. Corp., Inc.
Missouri P. & L. Co.	Pacific Power & Light Co.
Minnkota Power Co-op, Inc.	Alabama Power Co.
South Carolina E. & G. Co.	Central Illinois Public Service Co.
Pacific Gas & Electric Co.	Tennessee Valley Authority

POWER UTILITIES EQUIPMENT DIVISION

Motorola Communications & Electronics, Inc.

A SUBSIDIARY OF MOTOROLA, INC.

TECHNICAL BULLETIN ON REQUEST—DI PT. EW

4501 AUGUSTA BLVD., CHICAGO 51

Hotpoint

automatic clothes dryers expand opportunities for utility revenue

Automatic Dryers are used almost exclusively during off-peak hours . . . also their individual load is quite large. For these two reasons, widened sales of automatic dryers are most desirable for producing higher utility revenue.

Now—just look how Hotpoint has expanded the opportunity for this increased utility revenue.

The Hotpoint Dryer with its Sealed Drying Chamber does a masterful drying job, it's true . . . but what the Hotpoint Dryer *doesn't* do is just as important. Unlike other dryers, Hotpoint *doesn't* allow heat, moisture, and lint to enter the laundry area. Also the Hotpoint Dryer *doesn't* suck in dust and dirt to soil freshly laundered clothes. And, most important, the Hotpoint Dryer *doesn't require ugly, expensive venting.*

These advantages mean that every family can efficiently use a Hotpoint Dryer . . . whether in the utility room, den, kitchen, basement, bathroom, closet, or anywhere. No *special* place is needed. Thus the opportunity for revenue from automatic dryers is much expanded. The results enjoyed by owners of Hotpoint Dryers are accelerating automatic dryer acceptance. Have your Hotpoint distributor give you the complete facts on the Hotpoint Automatic Clothes Dryer with Sealed Drying Chamber. Learn the profit opportunities for right now, and for the future.

Again, Hotpoint *looks at Tomorrow, Today!*

HOTPOINT Co. (A Division of General Electric Company) 5600 West Taylor Street, Chicago 44, Illinois

C-D
best by
FIELD

It takes a hotfoot with a grin, and comes right back for more. Yes, there are C-D capacitor installations that have been standing out in the blazing desert sun, day in and day out for over 10 years—*with little or no maintenance required.* This severe service requirement is one of the reasons why C-D builds them bigger—for better dissipation of heat. That is why too, C-D capacitors have the lowest volt-ampere per square inch of radiating surface.

TEST

Still another reason why C-D's have this unusual trouble-free performance record, even under desert conditions, is their superior design that calls for the highest major insulation level and the lowest dielectric unit stress. Insure low-maintenance service from your next power-factor installation, by talking it over first with a C-D engineer. Cornell-Dubilier Electric Corporation, Dept. D-94, South Plainfield, New Jersey.

ONSISTENTLY EPENDABLE

CORNELL-DUBILIER CAPACITORS

FOR POWER-FACTOR IMPROVEMENT

PLANTS IN SOUTH PLAINFIELD, N. J.; NEW BEDFORD, WORCESTER AND CAMBRIDGE, MASS.; PROVIDENCE AND HOPE VALLEY, R. I.; INDIANAPOLIS, IND.; SANFORD AND FUQUAY SPRINGS, N. C.; SUBSIDIARY: THE RADIART CORPORATION, CLEVELAND, O.

THERE ARE MORE C-D CAPACITORS IN USE TODAY THAN ANY OTHER MAKE

here's why GrateLite* is great!

eye comfort you can measure
300 F.C. with only
1.11 C.P./Sq. In. Brightness

and here are the figures to prove it . . .

Foot-Candles, Efficiencies, Brightness Readings

Lumens per Sq. Ft.	No. of 9' Lamps	Total Lamp Watts	Foot-Candles: With Gratelites	Foot-Candles: Less Gratelites	CPI Watts per Sq. Ft.	Brightness at 20°: F. L.	Brightness at 20°: C. P. I.	Brightness at 45°: F. L.	Brightness at 45°: C. P. I.
3	6 on 200	600W	28	25	2.5	36	0.11	85	0.31
4	10 on 200	1000W	38	33	4.2	48	0.22	113	0.41
5	14 on 200	1200W	45	40	5.0	57	0.26	142	0.51
6	16 on 200	1600W	58	51	6.7	73	0.33	173	0.62
7	20 on 200	2000W	68	60	8.3	86	0.39	205	0.73
8	24 on 200	2400W	78	69	10.0	99	0.45	236	0.85
9	28 on 200	2800W	88	78	11.7	112	0.51	266	0.96
10	32 on 200	3200W	98	87	13.3	125	0.57	297	1.07
11	36 on 200	3600W	108	96	15.0	138	0.63	328	1.18
12	40 on 200	4000W	118	105	16.7	151	0.69	358	1.29

In our own showrooms we've installed a 15' x 16' GrateLite Ceiling. By switching on various lamp arrangements we can deliver from 28 to 300 foot-candles 7' 9" below the GrateLites. Measurements at right give GrateLite efficiency figures and brightness readings at 20° and 45° below the ceiling.

THESE FIGURES PROVE GRATELITE is a class by itself for modern high intensities, safely within comfort ranges plus a high degree of diffusion.

AREA: 15' x 16' (240 Sq. Ft.)
GRATELITES: Suspended 18" below ceiling
FT.-CANDLES: Taken 7' 9" below GrateLite
BRIGHTNESS READINGS: Taken with Electronic Meter
LUMINAIRES: Guth M-3385/TO
ROOM COLORS: 3 walls—light green—50% R. F. Floor—15% R. F.

*F. L.—Foot Lamberts †C. P.—Candlepower *Reg. U.S. Pat. Off. Trademark Registered

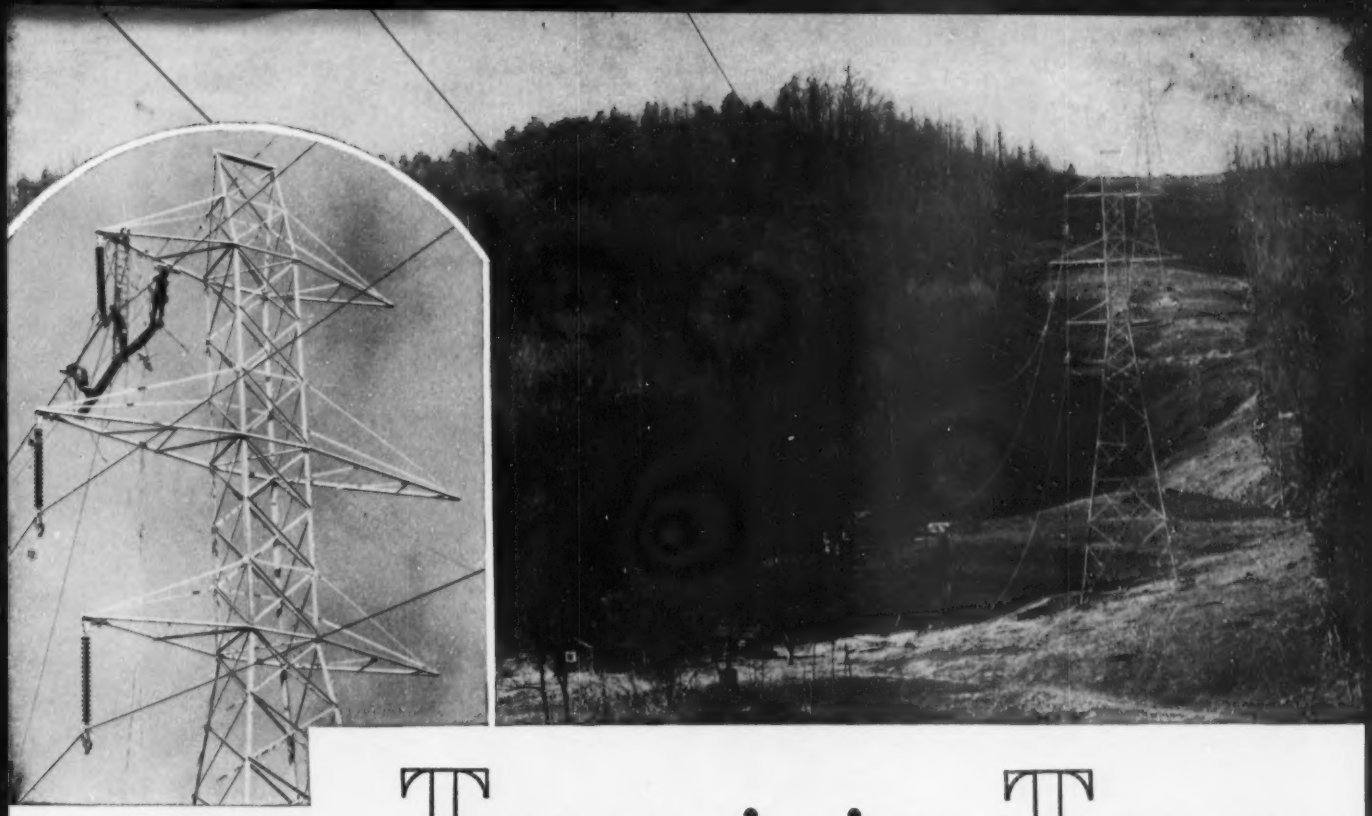
It's all in the sight-saving cubes—and only GrateLite has them!

Send for free booklet "The GrateLite Story" Also "Glare Factors" and "Visual Comfort Indexes".

Guth

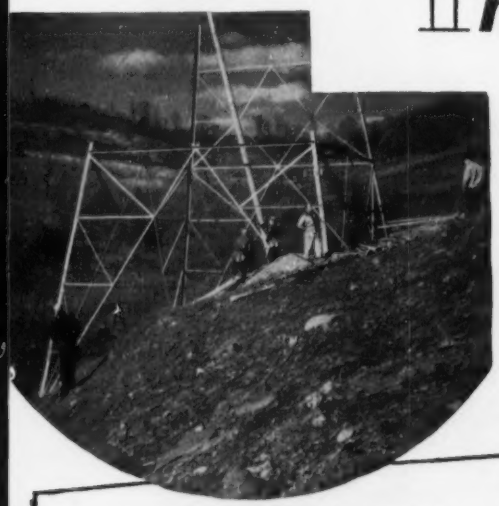
EDWIN F. GUTH CO. • ST. LOUIS 3, MO

Leaders in Lighting since 1902



Transmission Towers

designed to carry any load ...to fit any terrain!



Recent high voltage line towers by AMERICAN BRIDGE

Appalachian Electric Power Co.
Ohio Power Company
Public Service Company of Indiana
Duquesne Light Company
Dayton Power and Light Company
Cincinnati Gas & Electric Company
Detroit Edison Company
Toledo Edison Company
Idaho Power Company
Indiana & Michigan Electric Co.

AMERICAN BRIDGE steel towers carry many thousands of circuit-miles of transmission lines across this great land. Scaling the heights of rugged mountains; through marshy lowlands, traversing every conceivable kind of terrain, these steel transmission towers are helping make America's great power distribution system the world's best.

American Bridge towers are made to order for every type of transmission line service. They are designed for simplified erection on level, side-hill, or rocky butte sites. They are engineered for heavy-duty service under the severest climatic conditions.

Incorporating special design features such as steel grillage earth anchors and variable leg extensions, American Bridge towers make possible important savings in time, labor, and material costs.

The technical knowledge and experience American Bridge has acquired in more than fifty years of designing, fabricating and erecting towers may be just the answer to your problems. Our engineers welcome an opportunity to figure on your requirements. Just write our nearest office.

AMERICAN BRIDGE DIVISION, UNITED STATES STEEL CORPORATION
GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.

Contracting Offices in: AMBRIDGE · ATLANTA · BALTIMORE · BIRMINGHAM · BOSTON · CHICAGO
CINCINNATI · CLEVELAND · DALLAS · DENVER · DETROIT · ELMIRA · GARY · MEMPHIS
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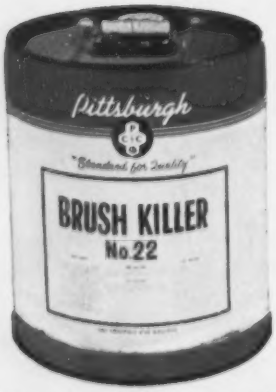
AMERICAN BRIDGE

USS

UNITED STATES STEEL

FOR SAFER, LONGER-LASTING BRUSH CONTROL—

Pittsburgh BRUSH KILLER No. 22



Standard for Quality

CLEARING brush from power line rights-of-way by hand or machine-cutting methods is costly, time-consuming and only temporary, at best. But you can do the job right the first time —and do it easier, safer and far more economically when you spray with *Pittsburgh* Brush Killer No. 22. Here's why:

EASIER—*Pittsburgh* Brush Killer No. 22 greatly simplifies your rights-of-way clearance problem. One crew of few men can kill more brush in hours than a dozen men can kill in days by hand. And the brush is killed right down to the roots.

SAFER—*Pittsburgh* Brush Killer No. 22 contains the highly effective low volatile Isooctyl ester that minimizes vapor drifts and possible damage to nearby crops. And it does not affect grass growth.

MORE ECONOMICAL—With *Pittsburgh* Brush Killer No. 22, you can clear your rights-of-way at far less cost per mile than by hand or mechanical methods. And cleared rights-of-way enable your maintenance crews to cover more miles per day, with savings in labor and equipment. ● Write today for complete details on *Pittsburgh* Brush Killer No. 22.

AGRICULTURAL CHEMICALS DIVISION
PITTSBURGH COKE & CHEMICAL CO.
Grant Building • Pittsburgh 19, Pa.

WAD 9088

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

Faster Pumping with a Homelite

It's as simple as this . . . your compact Homelite gasoline-engine-driven pump is right in your repair truck. Takes but little room. One man lifts the Homelite off the truck, puts it by the manhole, starts it and instantly you get action. You get the fastest self-priming . . . more volume than any other pump its size . . . a guaranteed 28 foot suction lift . . . and automatic seepage control. With no delays . . . no waiting for larger, heavier, harder to handle pumps . . . your manhole is pumped out and your men are on the job *but fast*.

Write for free complete bulletin.

HOMELITE CORPORATION
6109 RIVERDALE AVENUE, PORT CHESTER, N. Y
Carryable Pumps • Generators • Blowers • Chain Saws

"Thank You, Mr. Mullen"

An inquiry came across our desk recently for the names of distributors of Manson tape in Minneapolis. What snared our attention was the closing line in the note, "This is the 'best tape' that we have ever used, and we would like to obtain more." The writer, Mr. W. H. Mullen of the Bernard L. Dalsin Company of Minneapolis,

you can be assured, was answered promptly.

The Dalsin Company is not a big user of tape, they required only several rolls—but they did like it and took pains to get a new supply. This, we are certain, is the best testimonial to a good product.

Tape users everywhere have found that Manson tape is definitely a superior product. It is unequalled in true adhesiveness, and will retain this quality over extremely long periods. It is a true friction tape made of a closely woven cotton fabric into which has been frictioned only new, naturally tacky rubber compounded with the best chemical ingredients.

Okolite, Okoprene and Manson tapes make splices that will be tight and waterproof far longer than ordinary tapes, and consequently reduce maintenance costs. It's "spliced for life" when you use Okonite premium quality tapes.

Write for a set of instruction sheets EW 5678; they will help solve your splicing problems.

...when you splice with:

AVAILABLE THROUGH AUTHORIZED DISTRIBUTORS ONLY

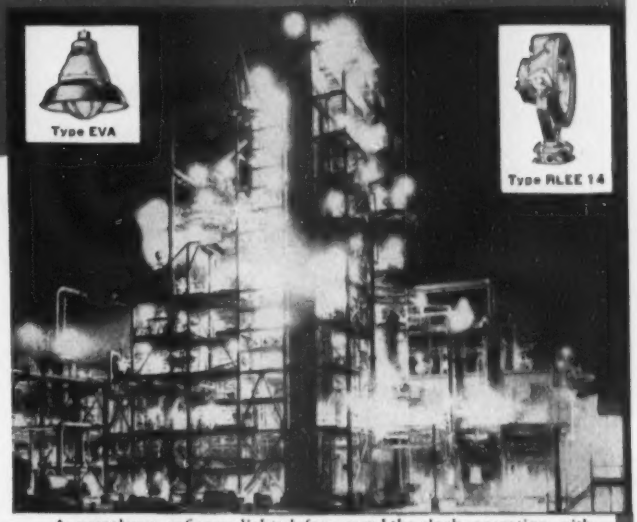
2042

Made by
THE OKONITE COMPANY
PASSAIC NEW JERSEY
SINCE 1878

SPECIALISTS IN ELECTRICAL WIRES, CABLES AND SPLICING MATERIALS FOR 75 YEARS

You can increase production at night by using Crouse-Hinds Floodlights to

"turn night-time into day-time"



A petroleum refinery lighted for round-the-clock operation with Crouse-Hinds Type EVA Explosion-Proof and Raintight Industrial Lighting Fixtures, and Type RLEE-14 Explosion-Proof Floodlights.

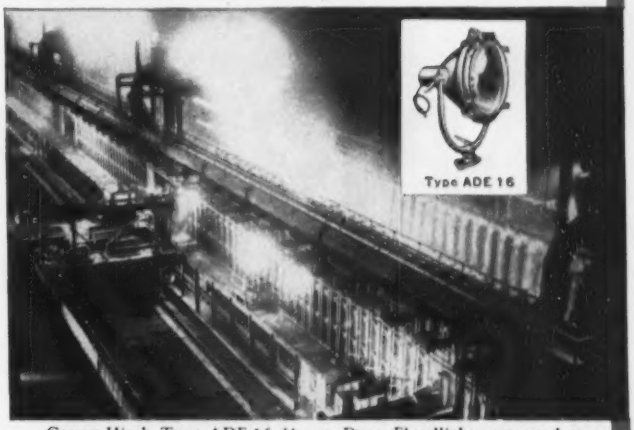
Production curves go up when Crouse-Hinds high efficiency floodlights are installed in yards and approaches to industrial plants.

The usefulness of many outdoor areas can be multiplied by flooding them with controlled illumination. Crouse-Hinds all-inclusive line with short, medium, and long range projectors makes it possible to get the right amount of light at the locations where it is needed. This control insures the clarity of daylight where it will do the most good, without wasteful over lighting of unused areas.

Frequently it will cost much less to project light a considerable distance with Crouse-Hinds long range floodlights than to run cable and install local lighting. There are also indoor locations in large buildings where floodlights are the most economical and satisfactory source of light.

Plenty of light is also the most reliable and cheapest form of protection against night prowlers. Sabotage and pilferage thrive in darkness. Crouse-Hinds floodlights project powerful beams of light that bathe all approaches to your property with glaring radiance, compelling everyone to be more visible than in broad daylight.

A Crouse-Hinds floodlighting installation pays off in: (1) increased production; (2) prevention of accidents; (3) protection against dangerous prowlers. Pioneers in floodlighting, Crouse-Hinds illumination engineers have accumulated a wealth of lighting knowledge that is at your service. Write for additional information and ask for your FREE copy of Crouse-Hinds Bulletin 2672 "Lighting Equipment". It contains listings of hundreds of types and sizes of floodlights and explosion-proof, dust-tight, and vaportight industrial lighting fixtures.



Crouse-Hinds Type ADE-16 Heavy Duty Floodlights are used to "turn night-time into day-time" at this plant for 24-hour production.

A parking lot efficiently lighted by Crouse-Hinds Type FLA General Purpose Floodlights.

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

OFFICES: Amarillo — Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland Dallas — Denver — Detroit — Houston — Indianapolis — Kansas City — Los Angeles — Memphis Milwaukee — New Orleans — New York — Philadelphia — Pittsburgh — Portland, Ore. San Francisco — Seattle — St. Louis — St. Paul — Tulsa — Washington
RESIDENT REPRESENTATIVES: Albany — Atlanta — Baltimore — Baton Rouge — Charlotte Chattanooga — Corpus Christi — Reading, Pa. — Richmond, Va. — Shreveport
Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

A Nationwide Distribution Through Electrical Distributors

FLOODLIGHTS · AIRPORT LIGHTING · TRAFFIC SIGNALS · CONDULETS

One of the basic advantages you get with

BTC

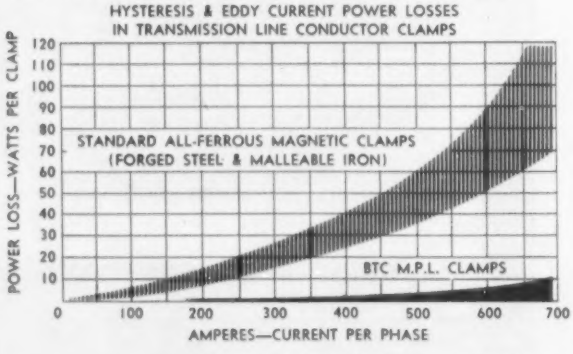
Drop-Forged M.P.L. Aluminum SUSPENSION CLAMPS

Sold Through Your Insulator Manufacturer Only

Forgings are employed where better strength, soundness and finish are required than can be obtained by other processes. Forging produces a fine, close-grained structure with the grain flow following the contour of the part and with optimum mechanical properties and ability to withstand severe loading, sudden shock and frequent reversal of stress.

BTC clamp body is forged aluminum alloy . . . the strongest recommended for the purpose, fully heat-treated to develop maximum mechanical properties. In the heat-treated condition, its ultimate strength and hardness are more than twice that of alloys used in other processes, while its yield strength and endurance limit are more than three times greater. The more-than-adequate catalogued strength ratings of BTC Clamps are conservative and are exceeded in actual tests.

Clamps are lightweight, too. Heavy sections or reinforcing ribs, which are necessary in other materials to develop desired strength and prevent collapse or breakage of the clamp under clamping U-Bolt pressure, are not required in BTC drop-forged Suspension Clamps. As a result, undesirable weight is eliminated without sacrifice of strength.



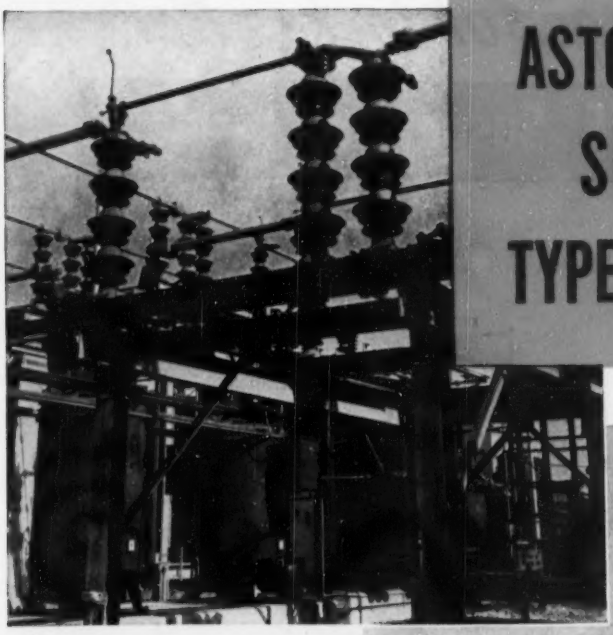
Drop-Forged BTC *Hi-Line Hardware*

The BREWER-TITCHENER CORPORATION

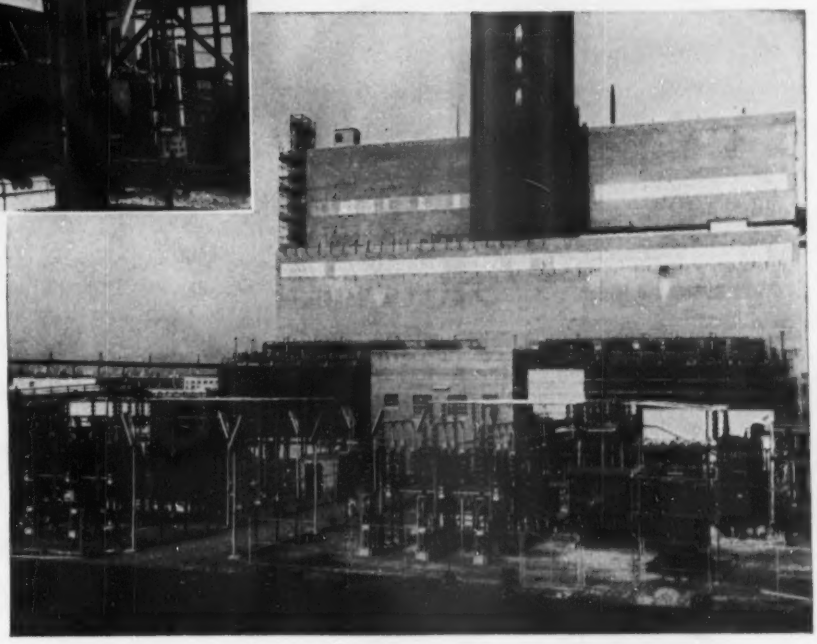
Cortland, New York

Specify BTC Clamps the next time you order from your insulator manufacturer. Their high strength is just one of the many reasons it pays to use these suspension clamps on your transmission lines.

ASTORIA STATION USES SOUTHERN STATES TYPE wag SWITCHES



In use at the Astoria Station are Southern States 161 kv, 1200 ampere Type WAG Air Break and G-WAG Grounding Switches, shown here. The Type G-WAG is mounted integrally with the Type WAG on either the jaw or hinge-end stationary insulator stack. Mechanical or electrical interlocks (or both) are supplied to prevent air switch and grounding switch from being closed at the same time.



A section of the Astoria Generating Station of the Consolidated Edison Co. of New York, Inc. The station when ultimately completed, will have a capacity of over a million kilowatts. The newest type of equipment is used in this latest addition to one of the nation's largest electric utilities.

Consolidated Edison Company's new Astoria Station, the last word in steam generating plants, naturally uses equipment that assures maximum protection against mechanical or electrical failure. Dependable service to its 2,800,000 meters has long been a must for one of the Nation's largest electric utilities. No chance can be taken with this vital load. So it was only natural that Southern States Type WAG Air Break and Grounding Switches were chosen for the Astoria Station.

The superior features of Type WAG Switches, in voltage rating from 7.5 to 230 kv and current ratings from 400 to 4,000 amperes, are fully described in our Bulletin No. 390-R. A copy of it is yours on request. Read it and find out why it will pay you to always specify Southern States Switches.

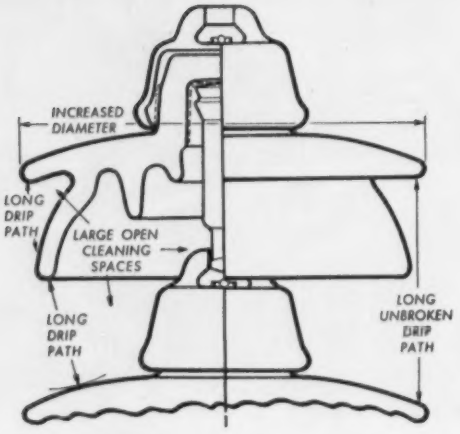
SS **SOUTHERN STATES EQUIPMENT CORP.**
HAMPTON, GEORGIA

6 design advantages of Locke's New

Fog-Type MICROGLAZE* Suspension Insulators

Note deep corrugations on easily reached protected under side of Locke Fog-Type Microglaze Insulators.

*Trademark of General Electric Company



1. LONG, PROTECTED LEAKAGE DISTANCE—Half of entire 17" effective leakage distance is on protected under side of insulator where entrapped warmth tends to dissipate fog and moisture. Deep corrugations on under side act as barriers, damping ionization and minimizing streamer formation. This reduces both audible and radio noise.

2. INCREASED IMPACT STRENGTH RATING of 55 inch-lb. results from improved design. High impact and mechanical strength is maintained by careful control of glaze uniformity and thickness which is typical of Microglaze insulators.

3. WIDE SPACING between units makes string assembly and cleaning in service much easier.

4. REDUCED NET WEIGHT lessens installation cost.

5. WIDER SPACING between skirts and between shells of adjacent units breaks up rain drip, reducing tendency to bridge over. This results in fewer flashovers, less radio noise and more reliable line operation.

6. RADIO INFLUENCE VOLTAGE is well below standard N.E.M.A. ratings under standard test conditions.

SPECIFY LOCKE'S new Fog-Type for operation in areas where heavy fog, smog, salt spray or industrial contamination demand maximum ratio of *effective* leakage distance to string length.

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

TWO THINGS to remember --

FOR DEPENDABLE
GROUNDING PROTECTION

1

DRIVE

Copperweld
TRADE MARK

SECTIONAL
GROUND RODS

DEEP

FOR YEAR 'ROUND
PROTECTION

2

MEASURE

RESISTANCE OF EACH SECTION

ALLOW FOR
SEASONAL
VARIATION

NEW BOOKLET
"Practical Grounding"

Its 36 pages are packed with the latest authoritative information on GROUNDING. A copy belongs in the files of every engineer responsible for planning reliable low-resistance grounds. Write for your copy today.

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION
Glassport, Pa.
For Export: Copperweld Steel International Company, New York

TOP PERFORMANCE FROM PROTECTIVE EQUIPMENT DEPENDS ON LOW-RESISTANCE GROUNDS

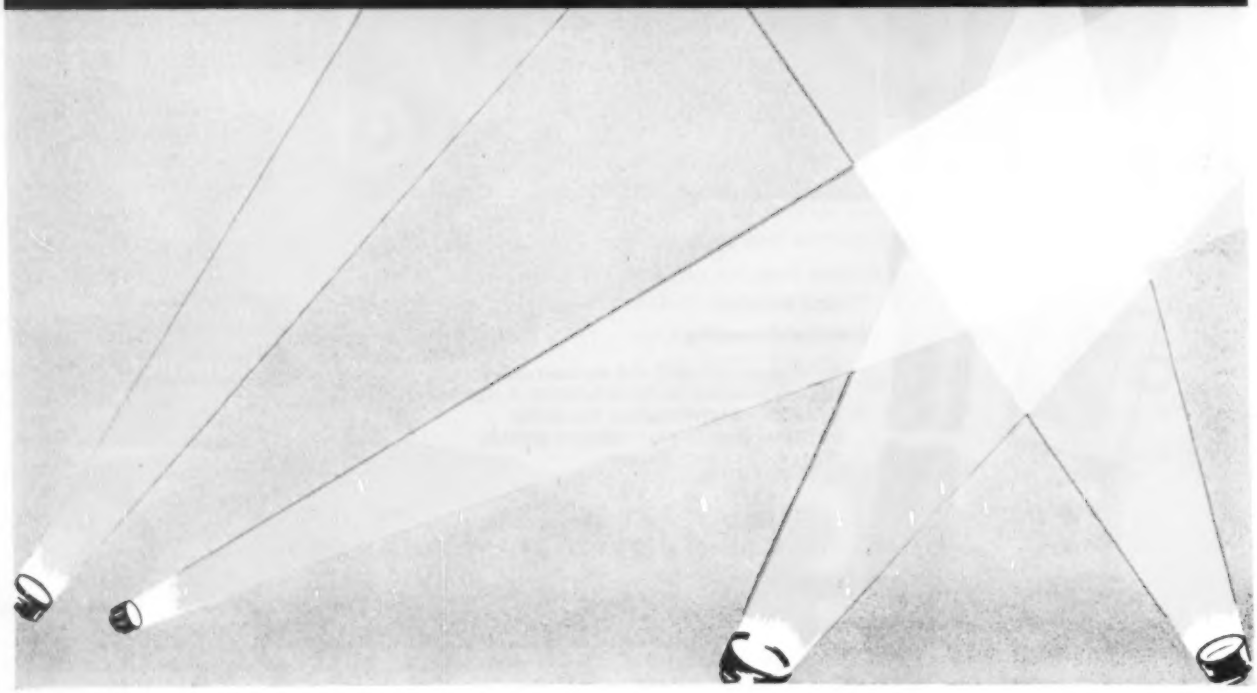
275,000 kw

The turbine-generator will be a single-shaft unit rated at 275,000 kw—the largest ever ordered. Throttle pressure—5000 psi. Steam temperature—1200 F. (Initial operation at 1150 F.)

FOR THE 1ST TIME ANYWHERE

at the new power station to be built by

PHILADELPHIA ELECTRIC COMPANY



6000 psi
1200 F

The boiler, to be built by Combustion, will be a C-E Sulzer Monotube Steam Generator of the "once-through" type, designed for a pressure of 6000 psi. Steam temperature — 1200 F.

8400 Btu/kwhr

Expected heat rate for the new station at 5000 psi throttle pressure and steam temperature of 1150 F is 8400 Btu per kwhr.

Combustion Engineering, whose equipment has been identified with many history-making power stations of the past, is especially proud of its selection to design and build the boiler for the new station of Philadelphia Electric Company — a station that represents the most advanced power practice to date.

COMBUSTION ENGINEERING

Combustion Engineering Building
200 Madison Avenue, New York 16, N. Y.

S-784

BOILERS, FUEL BURNING & RELATED EQUIPMENT; PULVERIZERS, AIR SEPARATORS AND FLASH DRYING SYSTEMS; PRESSURE VESSELS; AUTOMATIC WATER HEATERS; SOIL PIPE

30 TON GANTRY CRANE

built by PACECO

"TAILORS OF STEEL"®

McNary Dam, Columbia River, Washington

Unusual requirement for 85' long right-angle cantilevered auxiliary runway was solved at lowest cost with excellent architectural results by using standard Paceco lightweight rigid-frame all-welded construction. Connection between runway girders and gantry legs was completely shop-welded.

30 ton fixed position main hoist equipped with automatic Paceco Load Brake Reducer handles the main fishway pumps at 9' per minute. 6 ton auxiliary, 45' lift 35' per minute handles the trash racks and pump deck auxiliaries.

Two 7½ h. p. motors driving through Paceco Speed Reducers drive the gantry at 50' per minute. Totally enclosed gearing on the gantry drive is quiet running and oil tight, eliminating dust and dirt problems and giving low maintenance.

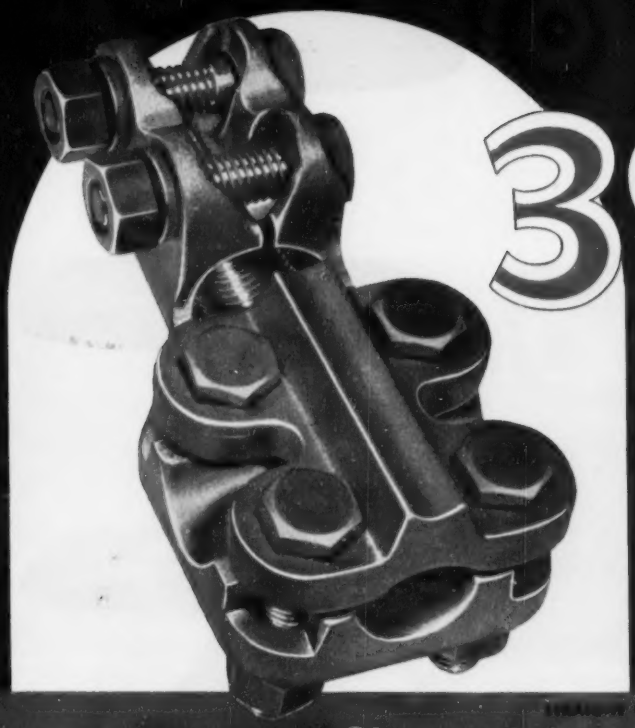
Paceco invites your inquiries when your needs fall within our scope of service, including cranes, gates, hoists, penstocks, pipe, valves and other units requiring skilled fabrication of metal plate and precision machine work.

One job . . . one responsibility

PACIFIC COAST ENGINEERING COMPANY

Alameda, California

ENGINEERS • MACHINISTS • FABRICATORS



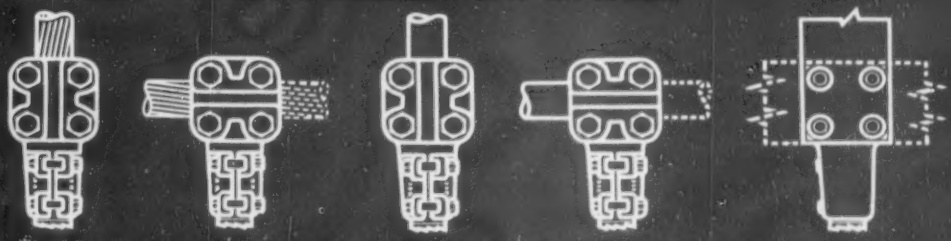
★ ABW DESIGN MEANS QUALITY *plus* STRENGTH in the RIGHT PLACES!

399* CONNECTION COMBINATIONS

with these new

ANDERSON UNIVERSAL STUD CONNECTORS... Types DSN & DSCT!

★ CABLE
★ TUBE
★ BAR



DSN . . .

5 stud sizes.
Cable sizes #6SOL through 2000 MCM.
½" IPS through 1½" IPS

DSCT . . .

7 stud sizes.
Cable sizes #2SOL through 800 MCM.
½" IPS through ¾" IPS.

*** HOW MANY CAN YOU COME UP WITH... WE STOPPED COUNTING AT 399!**

These new, versatile, multi-purpose connectors are ruggedly designed for tough service conditions . . . *and for wider application in a greater range of conductor sizes . . . cable, tube or bar!* The square conductor clamping cap permits 90° rotation, and is specially designed for minimum and maximum size conductors. They are cast of high-strength electrical bronze. Silicon bronze hex head bolts, nuts and lockwashers are furnished.

FOR MORE COMPLETE INFORMATION consult your nearest ABW representative or contact our home office.

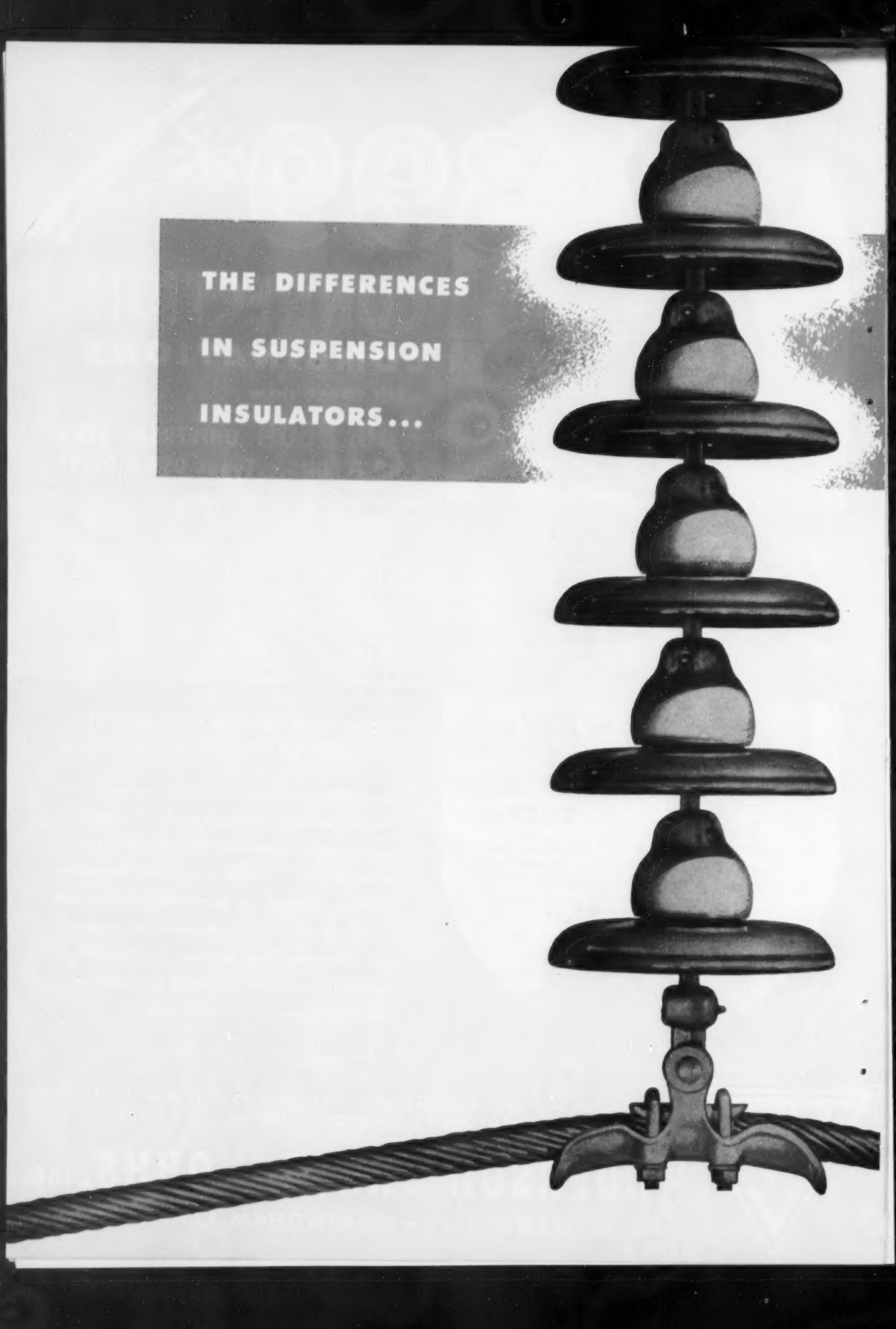
ABW

Aluminum & Bronze POWER CONNECTORS • CLAMPS • FITTINGS • ACCESSORIES
for SUBSTATION • TRANSMISSION • DISTRIBUTION SYSTEMS *for over a Quarter Century*

ANDERSON BRASS WORKS, INC.

P. O. DRAWER 2151 • BIRMINGHAM 1, ALABAMA

THE DIFFERENCES IN SUSPENSION INSULATORS...



. . . ARE IN THINGS YOU DON'T SEE IN "STANDARD SPECIFICATIONS"

NEMA Standard specifications for a suspension insulator call for a disc 10" in diameter, with 11½" of leakage distance, an M & E strength of 15,000 lbs.

If that's all it takes to produce "acceptable" suspension insulators, we've wasted a great deal of money and skilled effort at Lapp! Our continuing research, development, and control programs are dedicated to the positive knowledge that *there is a difference* in suspension insulator quality—and to the end that the differences will be on the side of users of Lapp suspension insulators.

We know of the improvement in our own product we have been able to effect in 35 years. We know how trifling variables in raw materials or manufacturing procedures can result in major differences in finished product. We know that uniform electrical and mechanical characteristics of porcelain, hardware quality, and proper assembly, are not matters of chance—nor even of habit.

And we know, too, that after a few years of service, insulators may not have the same characteristics as when shipped from the factory. Because modern construction practices protect insulators, it is possible for lines to stay in service with a dangerous proportion of insulators which will reveal their hazardous condition only under severe electrical or mechanical emergency.

Lapp insulators are more than "good enough to meet specification." They are good enough to offer a positive extra margin of operating safety and security . . . long life . . . and low upkeep. Many of America's best transmission companies have service records to prove it is so.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

Do you realize that one short circuit can shut down production for hours . . . damage expensive equipment . . . cause costly repairs? Generating capacity is on the increase . . . and a fault of tremendous magnitude is possible from the distribution lines serving you.

SHORT CIRCUIT PROTECTION CAN BE A SKELETON IN YOUR CLOSET!

EC&M Motor Starters give the protection needed for today's increased power. They are available in 50,000 KVA interrupting capacity and in the Valimitor (volt-ampere-limitor) type which provides unlimited protection against fault currents. When you install Valimitor Starters, there is no need to calculate existing KVA or to estimate future requirements. Even if the bus has infinite capacity, they limit the maximum fault current to 25,000 KVA.

Both types of EC&M Motor Starters are available with weather-resistant, explosionproof or other enclosures to meet any operating conditions.

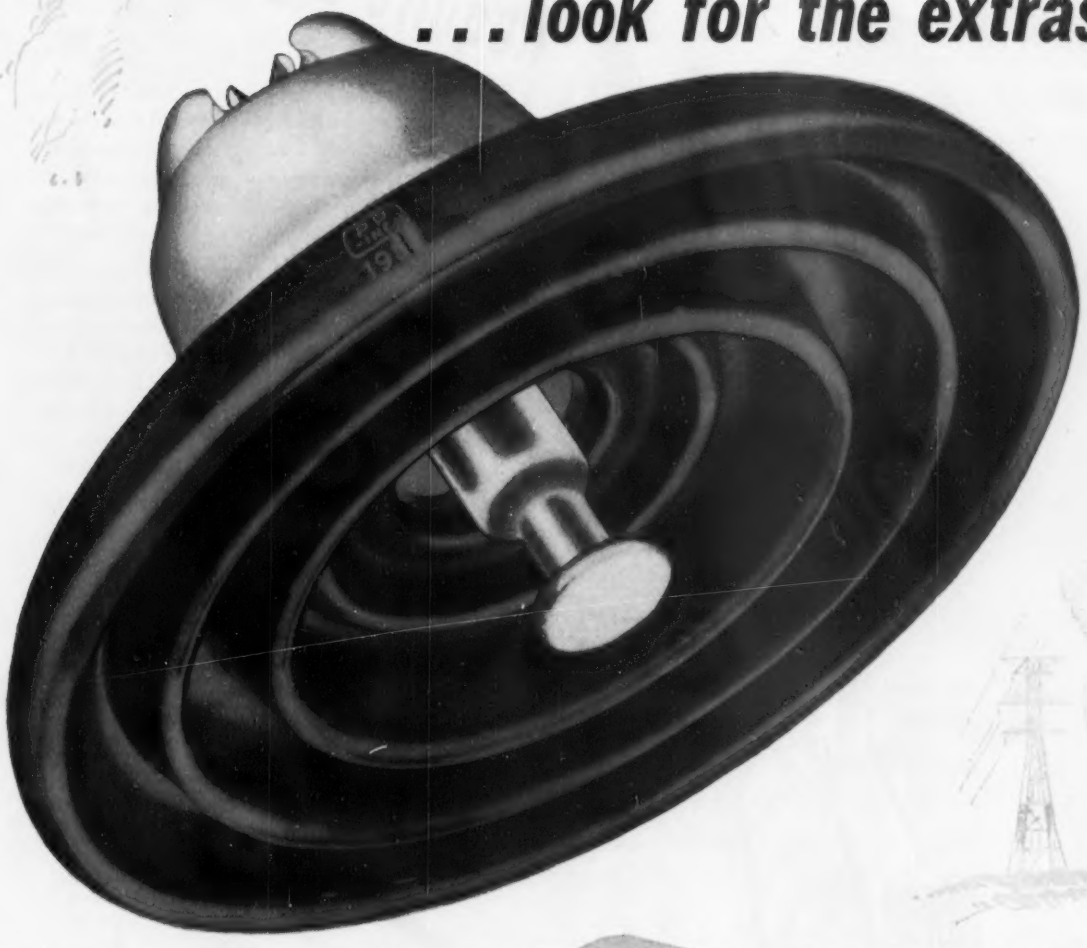
Equip your 2200-5000 volt motors with these dependable starters . . . and get rid of that skeleton in the closet.

For complete details, write today for Booklet 1062.

THE ELECTRIC CONTROLLER & MFG. CO.

2698 East 79th Street • Cleveland 4, Ohio

TODAY ...look for the extras!



Standards are guides. They provide power men with basic performance characteristics. But with suspension insulators, **today**, it's the *plus* values that count—that mean *extra* built-in factors of safety—better performance. For instance, at Porcelain Products, standard tests are not enough. We look *beyond* the tests—to craftsmanship . . . research—to individual performance standards of men and the machines they operate.

From clay selection to final shipment, better controls and methods are under constant study. You can *rely* upon Porcelain Products to give you *more* extras—extras that mean "better than standard" performance.

Quality You Can Trust

EXPORT REPRESENTATIVE . . . Philips Export Corporation, 100 E. 42nd Street, New York 17, New York, U. S. A. Cable Address—"PHILYORK"

PP INC.

YOUR INDEPENDENT INSULATOR MANUFACTURER

Porcelain Products, Inc.

PARKERSBURG, W. VA.

Tight, uniform loads of J. Neils "Double-Life" treated poles are insured by using a 40-ton capacity crane in rail car loading operations.

Big Poles Require Big Equipment

Here at the Pole Division of J. Neils, daily production reaches 35,000 lineal feet of pole material. It's a *big* job that requires *big* equipment, *big* know-how in pole manufacture, *big* natural resources and *big* experience in the forest products industry.

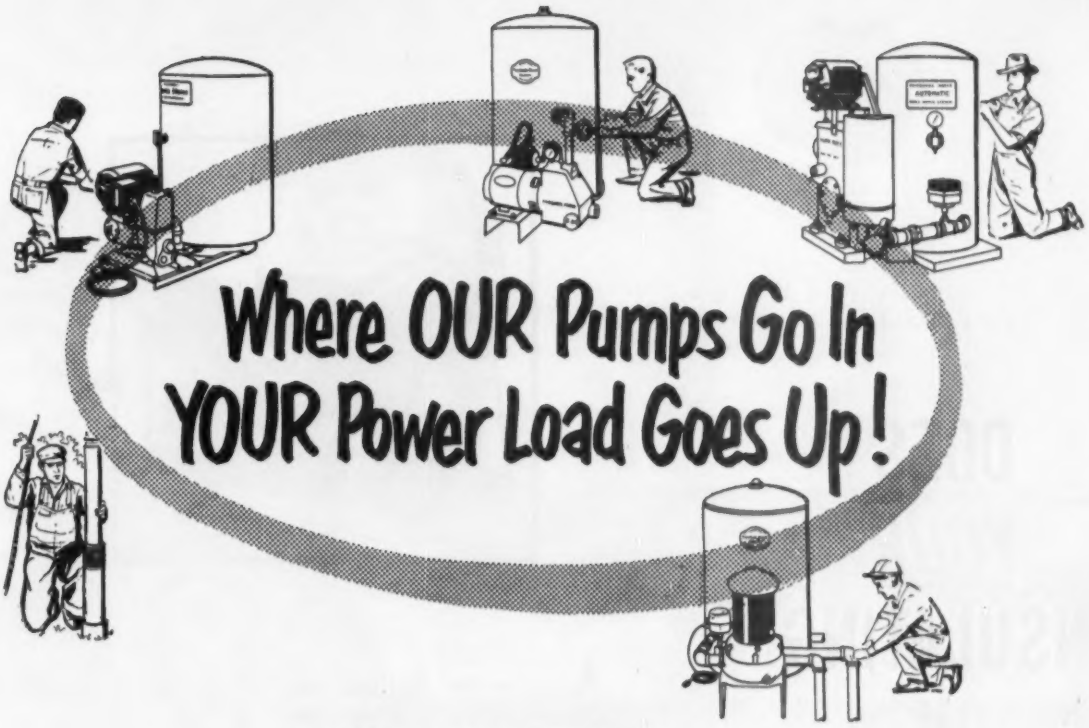
Much of the finest transmission pole timber in the U. S. grows on the 200,000 acres of forest land owned by J. Neils in western Montana. We concentrate on the manufacture of poles from Western Larch, Lodgepole Pine and Douglas Fir. We have been in business since 1895 and it is our privilege to serve utility companies, large and small, in various sections of the country.

An illustrated folder on J. Neils "Double-Life" poles (penta or creosote treated), and information regarding their application to your requirements, will be furnished gladly.

J. Neils Lumber Company

Pole Division: **Libby, Montana**

J N



Where OUR Pumps Go In YOUR Power Load Goes Up!

Usually the first home utility bought by a new high line customer is an electric water system.

With this basic utility installed in the home, a woman becomes the world's best prospect for many other load-building appliances—a water heater, washer dryer, ironer; garbage disposal unit, an electrically-controlled heating system, and an automatic dish washer.

Her husband also buys load-building appliances. Often he installs a water heater in the milk house before his wife enjoys one in her home. He buys electrically operated water tank heaters and automatic waterers. And he may even install a *second* electric pump for farm operations only!

FAIRBANKS-MORSE

a name worth remembering when you want the best

WATER SYSTEMS • GENERATING SETS • MOWERS • HAMMER MILLS • PUMPS
MAGNETOS • MOTORS • SCALES • DIESEL LOCOMOTIVES and ENGINES

What you ought to know about our water systems

Since electric water systems are *big* factors in helping you build up power loads, you ought to know all about them. So we've thought of ways to help you. First, we'll be glad to supply you with educational wall chart selection guides, and booklets showing types of pumps, their capacities and uses. Second, we'll loan you slide films showing installations of a new submersible pump. For complete details, mail the coupon!

Fairbanks, Morse & Co.
600 S. Michigan Ave., Chicago 5, Ill.

Please send a representative to show us how to use your wall charts and interpret your literature on home water systems.

Name .....

Address .....

City ..... RD.... State.....

DOES *YOUR* INSULATING OIL PURIFICATION MEASURE UP TO *THESE* STANDARDS ?

Appraise the method you are now using to purify transformer and circuit breaker oil . . .

WILL IT reduce the water content of new oil at 90° F from an initial 1/10 of 1% to 1/1000 of 1% (35 kv dielectric strength)?

WILL IT dehydrate completely at a *single* pass?

DOES IT do its work at *low* temperature—thus avoiding any danger of carbonization and any chance of loss of dielectric strength *after* purification?

DOES IT maintain its efficiency during the *entire* run, with no shut-downs required for cleaning or renewal of parts?

DOES IT operate at low cost?

De Laval Insulating Oil Purifiers can and do meet these requirements. That is why they are used by the great majority of large power companies in the country.

Bulletin TR-1 gives complete information about De Laval Insulating Oil Purifiers, including specifications of the various models, operating characteristics, and the DE LAVAL PERFORMANCE GUARANTEE. *Write for it.*

THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York
427 Randolph St., Chicago 6
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DE LAVAL

GUARANTEED INSULATING OIL PURIFIERS

it's time for a new meter...

when Mrs. Forbes...

Better look at the Forbes' meter—it's probably inadequate. It was never designed to measure a load like this. It may run slow on heavy loads, or it may burn out.

The Sangamo J2, the meter with straight-line accuracy up to 100 amperes, will prevent lost revenue. The J2 has adequate capacity to carry 100 amperes continuously without overheating and sufficient torque to accurately measure even the lightest load.

The J2 is *the* slow-speed meter that makes fewer revolutions per kilowatt-hour—bearings last longer.

When you buy new meters to handle today's growing use of electricity, protect your investment by choosing a meter with plenty of reserve capacity for continuously growing loads.

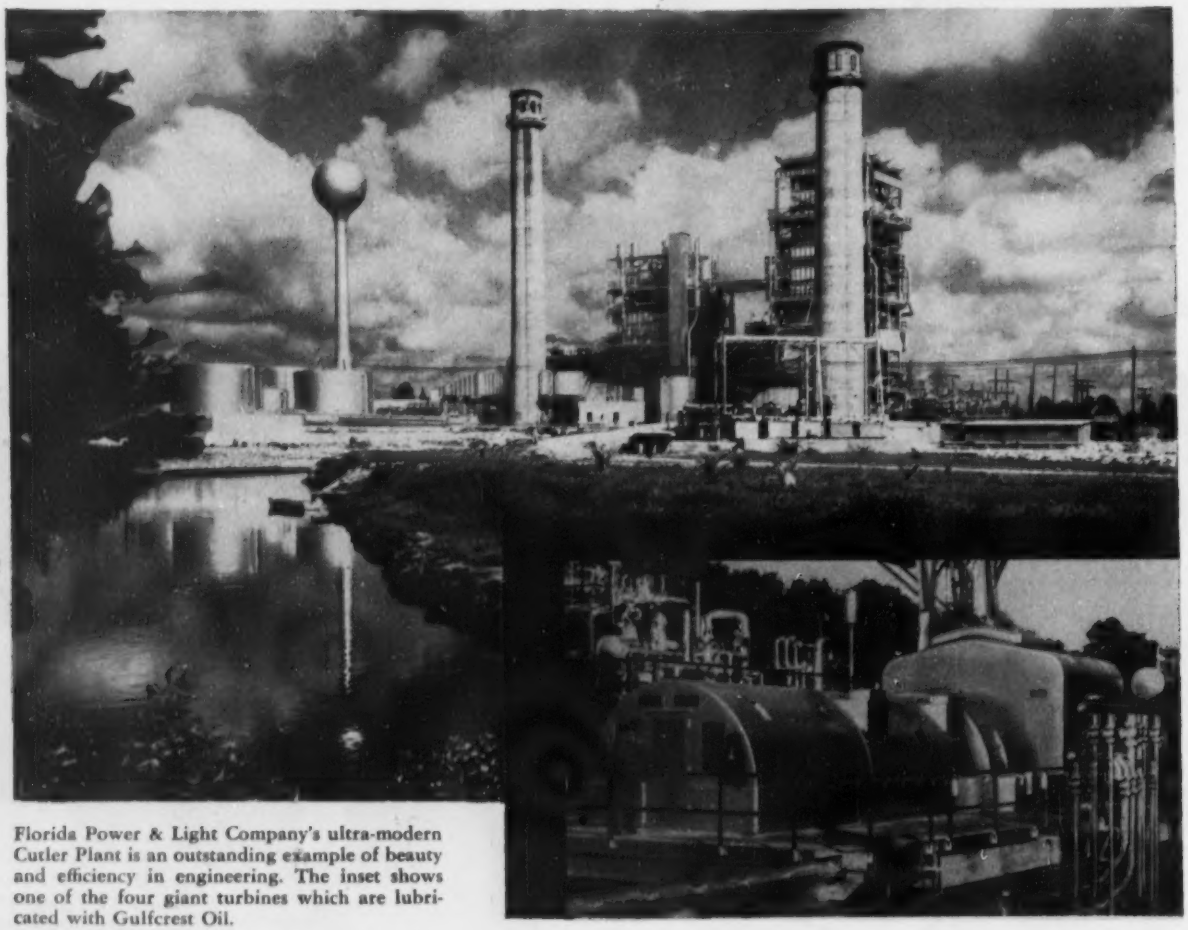
Choose the new Sangamo J2—the first . . . and finest . . . 15 ampere meter with 100 ampere capacity.

A METER WITH STRAIGHT LINE ACCURACY

UP TO 100 AMPERES

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

Gulfcrest Oil selected for Florida's newest and largest power plant



Florida Power & Light Company's ultra-modern Cutler Plant is an outstanding example of beauty and efficiency in engineering. The inset shows one of the four giant turbines which are lubricated with Gulfcrest Oil.

Setting the pace for Florida's phenomenal economic growth is the Florida Power & Light Company which serves 452 thousand customers in the Sunshine State. Included in its current $332 million expansion program is the giant new Cutler Plant—largest in the state.

The four huge generators (whose capacities total 160,000 kilowatts) and auxiliary equipment in the Cutler Plant are lubricated with Gulfcrest —the world's finest turbine oil.

Gulfcrest Oil was not chosen at random for this important job. It has a background of superior performance in other Florida Power & Light Company plants, as well as in scores of other prominent utilities in Gulf's marketing territory.

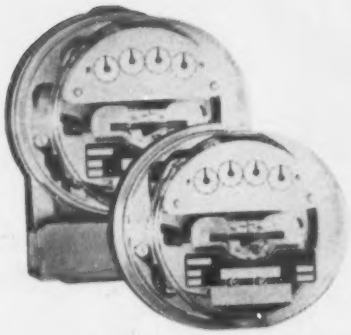
In many installations Gulfcrest has been in service over 15 years without any significant change in its original characteristics, and with neutralization numbers always remarkably low.

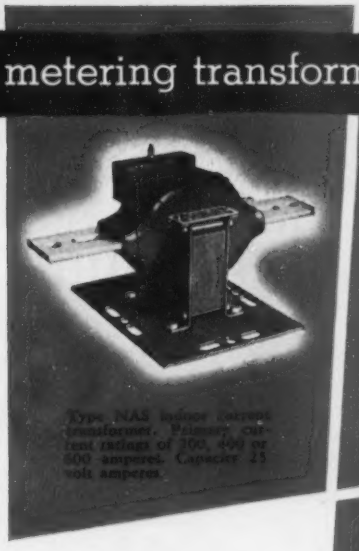
You'll be joining an impressive group of satisfied users when you fill your turbine system with this outstanding oil.

Your nearest Gulf office has a Gulf Sales Engineer always available to recommend the proper grade of Gulfcrest Oil for your turbine. Call him today, or write to the Gulf Oil Corporation, 1822 Gulf Building, Pittsburgh 30, Pa.

GULF INDUSTRIAL LUBRICATION

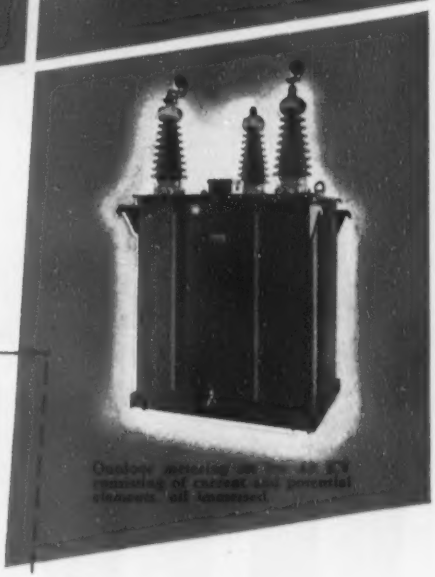
current, potential and metering transformers





Type NAS indoor current transformer. Primary current ratings of 300, 400 or 600 amperes. Capacity 25 volt amperes.

Indoor type metering potential transformer 202 VA, 2400/120 volts, 60 KV FW impulse level.



Outdoor metering set — 46 KV consisting of current and potential transformers, oil immersed.

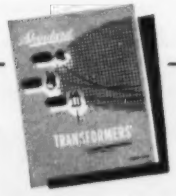
When accuracy is a factor

In the field of measurement for precision metering, operation of indicating instruments, relays and control apparatus, there is no substitute for accuracy.

The Standard Transformer Company has designed and is manufacturing a complete line of accurate current and potential transformers for every application... current, potential and metering transformers for any voltage up to and including 72 KV, and at any specified frequency. All thermal and mechanical ratings in accordance with industry's requirements and standards for each specific use. All standards set by ASA and EEI-NEMA in respect to accuracy are met.

Many prominent manufacturers of switchgear and control apparatus are regular users of STANDARD current and potential transformers. Our production facilities are flexible and engineering skill versatile enough to produce quickly transformers of special design to meet your specifications. Call in your STANDARD representative for further information.

everything points to



WRITE FOR BULLETIN S-501-B

32 pages of detailed drawings, accuracy limits, ratio and phase angle curves for current, potential and metering transformers. Write for your copy today.

Standard

THE STANDARD TRANSFORMER COMPANY

WARREN, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES

Pioneering New Horizons
our specialty . . .

FROM THE FIRST MOMENT Pioneer is retained to help you plan your new electric power station, Pioneer becomes a part of your company, thinking and planning in your best interests . . . Pioneer has 52 years of experience to aid in determining the necessary plant capacity and its construction cost, to select the site and design the generating station . . . Pioneer will also design any needed service or office buildings and act as your agent in purchasing construction supplies and materials . . . Pioneer offers complete valuation, depreciation and rate services . . . .it will supply stock transfer and dividend distribution services . . . Our consulting staff provides experienced advice on company management, corporate finance, accounting and taxation matters . . . a well-rounded schedule to relieve your overload periods.

For complete information on Pioneer's services, write for our factual booklet, "Pioneering New Horizons", yours for the asking.

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231 South La Salle Street · Chicago 4, Illinois

52 YEARS

NEW

No. 53-XPJ Nicopress Tool with *Three Grooves*

Accommodates Nicopress Sleeves

FOR COPPER

1 solid, 1 seven strand, 2 solid, 2 seven strand, 2 three strand, 3 solid, 4 solid, 4 seven strand, 4 three strand, 6 solid, 6 seven strand, 8 solid, 8 seven strand, 3 No. 10, 3 No. 8.

FOR COPPERWELD

4A, 6A, 8A, 6C, 8C, 6D, 8D, 9½D, 3 No. 10, 3 No. 12, 4 solid, 6 solid, 8 solid, 10 solid.

FOR ALL-ALUMINUM

2 solid, 2 seven strand, 4 solid, 4 seven strand, 6 solid, 6 seven strand, 8 solid.

FOR AMERDUCTOR

8SCP or SCG, 10SCP or SCG, 12SCP or SCG.

Write for descriptive folder.

Nicopress Sleeves and Tools Patented in U. S. and Foreign Countries. "Nicopress" Registered in U. S. and foreign countries.

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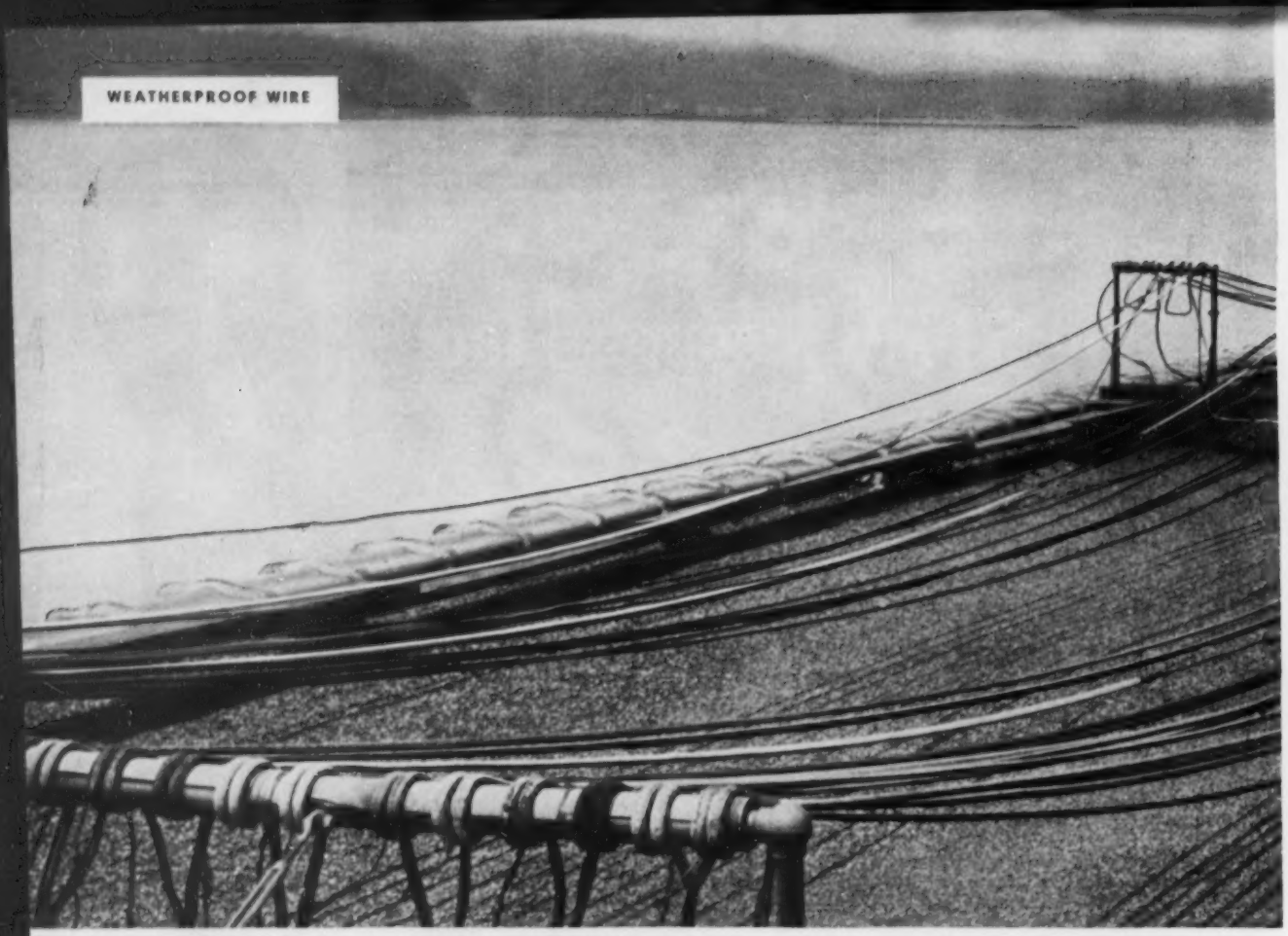
THE NATIONAL TELEPHONE SUPPLY COMPANY

WEATHERPROOF WIRE



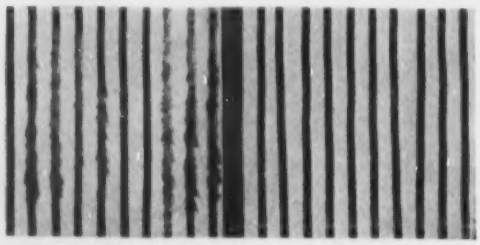
Anaconda's exposure rack at Hastings-on-the-Hudson. This rack is used to study the effects of *natural aging* on wire and

HERE—Duraline passes the toughest

20 years on a torture rack—Duraline licks acrid smoke, salt air, sunlight, ice and snow

How do you test weatherproof wire? By accelerated test in the laboratory? By long exposure to *natural* conditions?

At Anaconda we take both courses. Accelerated tests tell us many things — and tell us quickly. But the most reliable test of all—true, infallible—is *the test of time.*



Some standard types (above), after severe aging test, begin to come apart and festoon.

Unretouched photograph shows that Duraline (above), after exposure to severe aging, remains completely weathertight.

Duraline* is the *one* weatherproof wire that has *passed* this test!

In 1934, hundreds and hundreds of feet of Duraline were installed on special outdoor racks at Anaconda's plant on the Hudson River. In the 20 years since, this wire has been subjected to the most corrosive conditions possible: acrid industrial smoke, salt mist, rain, scorching sun in summer, and ice and sleet in winter.

This wire still stands today. And Duraline shows absolutely *no sign* of deterioration . . .

cable coverings. Duraline—on the rack for 20 years—shows no sign of future festooning.

test of all: THE TEST OF TIME

not the slightest sign of future festooning. This after 20 years!

ALUMINUM OR COPPER

Only Anaconda makes a line wire like Duraline. Your choice of aluminum, copper or copperweld conductor. Ask your Anaconda Salesman or Distributor for full information and an actual sample to look over. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

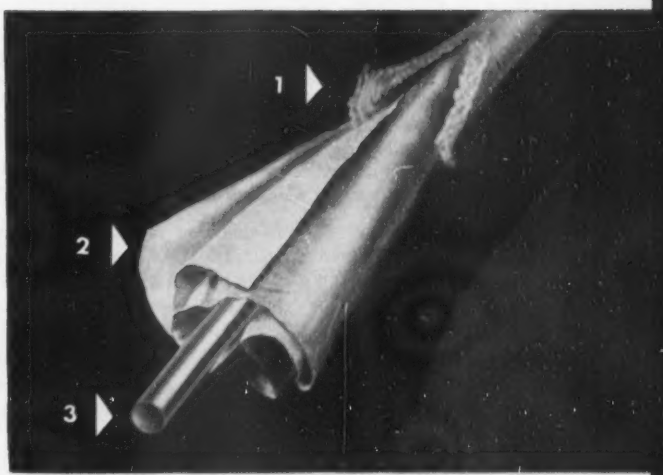
54877

*Reg. U.S. Pat. Off.

DURALINE

WEATHERPROOF LINE WIRE

ANACONDA®



Duraline eliminates festooning, and reduces grounds and shorts in wet, windy and icy weather due to contact with foreign objects. The reason is Duraline's unique construction.

1. Outer braid, URC saturated and finished. Experience shows this covering gives finest weather protection.
2. Note *continuous* sheath of interlocked and felted, fibrous material. Water cannot "wick" through it.
3. Aluminum, copper or copperweld conductor.

"It costs us only 34¢ for every $1.00 of new revenue commercial cooking brings in!"

... Carl T. Bremicker, Vice President, In Charge of Sales, Northern States Power Co., Minneapolis, Minn.

What is new E.A.R. worth? Many utility executives often use the rule-of-thumb that says you can spend $1.00 to get $1.00. But up at the Minneapolis headquarters of Northern States Power, the records show that an all-out drive for commercial cooking load is building a *whole new business* for this great Minnesota utility—and at a cost of just 34c per new $1.00 of E.A.R.

"In 1950," points out vice president Carl T. Bremicker, "E.A.R. from commercial cooking totalled $60,000. Our determination to go after the market with trained manpower and aggressive promotion brought that figure up to over half a million dollars in 1953, and we'll pass the $1,000,000 mark by the end of 1955!"

How Can You Promote Commercial Electric Cooking In Your Territory?

Yes, a great potential exists in commercial cooking. However, maximum returns require *thorough* promotion. Here are the essentials of Northern States Power's program:

- calls and *repeat* calls on food service operations.
- display and demonstrations.
- sales contests.
- training courses for company and dealer salesmen.
- trial use of counter line equipment.
- free service for one year on equipment sold.

Results? 75% of all trial equipment was sold—for an increase of 2.85 kw per operator!

"It's surprising that the profit potential in commercial cooking needs to be advertised ..."

J. Roscoe Furber, Gen. Sales Mgr.

"... because we know of so many utilities that have been so tremendously successful in commercial cooking promotion that we assumed it already had universal recognition as an indispensable building medium."

"Year 'round promotion makes commercial cooking big business!"

Walter E. Gilbert, Manager, Industrial Sales

"Unlike lighting, refrigeration and air conditioning, commercial cooking doesn't *have* to go electric! If we eased up on commercial cooking promotion tomorrow (which we have no intention of doing!), new revenues would soon slip back to old levels, because there is real competition for this load. Its characteristics are very nearly ideal."

"Promotion program to be enlarged, public service to be continued in 1954!"

John C. Newhouse, Supervisor, Industrial Sales

"Much of our commercial cooking market is still untapped. As a result, we intend to enlarge our promotion even further next year. And while we are adding kw's, this program helps our customers increase their profits, too! For instance, the Dutch Mill Night Club, Minot, North Dakota, replaced two competitive 110-lb. fry kettles with one 28-lb. capacity Hotpoint Mark 313 electric frying machine, at a savings of $45.00 a month in fat alone!"

YOU CAN MATCH THE NSP SAGA

The time is now. Why not share our commercial cooking services and programs? Write and I will give your letter my personal attention.

Orrin E. Wolf.

Orrin E. Wolf, Vice President, Hotpoint Co.

Hotpoint ALL ELECTRIC **Commercial Cooking Equipment**

Hotpoint Co. A Division of General Electric Company

Commercial Equipment Department, 265 South Seeley Avenue, Chicago 12, Illinois

Consider the unique K-weld* technique...

when critical piping is the order!

View of inside of pipe, showing root bead. Note the highly uniform, crack-free surface obtained through use of K-Weld method.

With today's operating conditions already approaching the limits of available power piping materials, the necessity for expert fabricating techniques cannot be overstressed. And it is here that the K-Weld* process, Kellogg's unique welding method, has already played an important part.

For example, K-Weld was used throughout—both in the shop and in the field—for the welding of austenitic stainless steam piping for service at 1100°F and 2350 psig on two 145,000 Kw units in Kearny Station of Public Service Electric and Gas Co. of New Jersey. It is also being employed in the critical piping for a similar unit at the Company's Burlington Station.

Main advantage of this new welding process lies in the fact that it assures *complete penetration without backing rings.* Their elimination precludes the possibility of crack propagation at the weld root which would produce ultimate failure as a result of severe operating conditions.

An additional advantage is the elimination of the possibility of the backing ring breaking off and damaging equipment. Furthermore the lack of a ring materially reduces turbulence in pipes.

The K-Weld process—developed in Kellogg's Welding and Welding Practices Group—entails the use of inert-gas arc welding of the first pass with inert-gas under *controlled pressure* on the inside of the piping. It permits an average welder qualified for inert-gas arc welding to obtain excellent results either in the field or in the shop. The K-Weld technique may be used on all power piping materials.

Fundamental development work leading to advances in the art of fabrication is an important part of Kellogg's basic stock in trade. Many power station designers and utility companies also say it's one basic reason why they time and again specify Kellogg when critical power piping is the order.

New Power Piping Booklet Published . . . Send for descriptive literature about Kellogg's extensive facilities for assuring the highest quality workmanship. A section of the booklet is devoted to detailed coverage of the K-Weld process.

These leading companies are among the many major producers of power who use M. W. KELLOGG POWER PIPING . . .

- Metropolitan Edison Co.
- Mexican Light & Power Co. (Mexico)
- Monongahela Power Co.
- New York State Electric & Gas Company
- Niagara Mohawk Power Corp.
- Palestine Electric Corp., Ltd. (Israel)
- Philadelphia Electric Co.
- Public Service Co. of Northern Illinois

OTHER FABRICATED PRODUCTS include: Pressure Vessels . . . Vacuum Vessels . . . Fractionating Columns . . . Drums and Shells . . . Heat Exchangers . . . Process Piping . . . Bends and Headers . . . Forged and Welded Fittings

For further information, details of methods, etc. contact

FABRICATED PRODUCTS DIVISION

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225 Broadway, N.Y. 7, N.Y.

also Jersey City; Buffalo; Birmingham; Chicago; Los Angeles; Tulsa; Houston; Ponca, Puerto Rico

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*Trade-mark of the M. W. Kellogg Company.

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HIGH PRESSURE
POWER PIPING
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NEW CHEVROLET TRUCKS

shorten your schedules and cut costs in the bargain!

You can actually count on a Chevrolet truck doing your job faster and for less money. That's a strong claim, sure; but one that's been proved time after time on job after job.

EXTRA POWER SAVES YOU TIME

All three Chevrolet truck engines—the "Thriftmaster 235," the "Loadmaster 235" and the "Jobmaster 261"*—deliver extra horsepower for greater acceleration and hill-climbing ability. You haul your loads on a time-saving schedule and save money doing it—for with Chevrolet's higher compression ratio you use less gas.

BUILT-IN RUGGEDNESS SAVES YOU MONEY

Stronger, more rigid frames, newly designed clutch; huskier rear axles and drive lines in 2-ton models; higher capacity universal joints in medium- and heavy-duty models—these beefed-up built-in chassis features mean your Chevrolet truck is going to stay on the job for a longer time. They also mean you can expect extra-low operating costs.

Another important advantage is Chevrolet's low original cost—lowest of all lines of trucks! You save the day you buy, and you go right on saving as long as you own that Chevrolet truck. Drop by your Chevrolet dealer's and look over the many models he has to offer. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

MOST TRUSTWORTHY TRUCKS ON ANY JOB! CHEVROLET

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

THREE GREAT ENGINES—The new "Jobmaster 261" engine* for extra heavy hauling. The "Thriftmaster 235" or "Loadmaster 235" for light-, medium- and heavy-duty hauling. **NEW TRUCK HYDRA-MATIC TRANSMISSION***—offered on ½-, ¾- and 1-ton models. Heavy-Duty **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **DIAPHRAGM SPRING CLUTCH**—improved-action engagement. **HYPOID REAR AXLE**—for longer life on all models. **TORQUE-ACTION BRAKES**—on all wheels on light- and medium-duty models. **TWIN-ACTION REAR WHEEL BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—greater holding ability on heavy-duty models. **NEW RIDE CONTROL SEAT***—eliminates back-rubbing. **NEW, LARGER UNIT-DESIGNED PICKUP AND PLATFORM STAKE BODIES**—give increased load space. **COMFORTMASTER CAB**—offers greater comfort, convenience and safety. **PANORAMIC WINDSHIELD**—for increased driver vision. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—easier, safer handling. **ADVANCE-DESIGN STYLING**—rugged, handsome appearance.

**Optional at extra cost. Ride Control Seat is available on all cabs of 1½- and 2-ton models, standard cabs only in other models. "Jobmaster 261" engine available on 2-ton models, truck Hydra-Matic transmission on ½-, ¾- and 1-ton models.*

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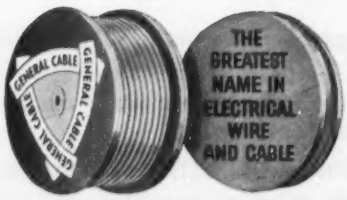
SAFETY M.I. WIRING SYSTEM

PERMANENT | FLEXIBLE | RUGGED | MOISTUREPROOF | RESISTS HEAT | SMALL DIAMETER SAVES SPACE

THE WORLD'S NEWEST, MOST VERSATILE ELECTRICAL WIRING!



BARE, WEATHERPROOF, INSULATED WIRES and CABLES FOR EVERY ELECTRICAL PURPOSE

1953 Code Approved for wiring jobs up to 600 volts, Safety m.i. Wiring has proved its versatility for power, lighting and control. In power plants, industrial and commercial buildings, processing plants, ships and in dozens of other applications where deterioration is a major problem.

By acting as its own conduit... by unique flexibility and small diameter... Safety m.i. Wiring has further proved its ability to provide lower installed costs. For information on this amazing product, check General Cable today.

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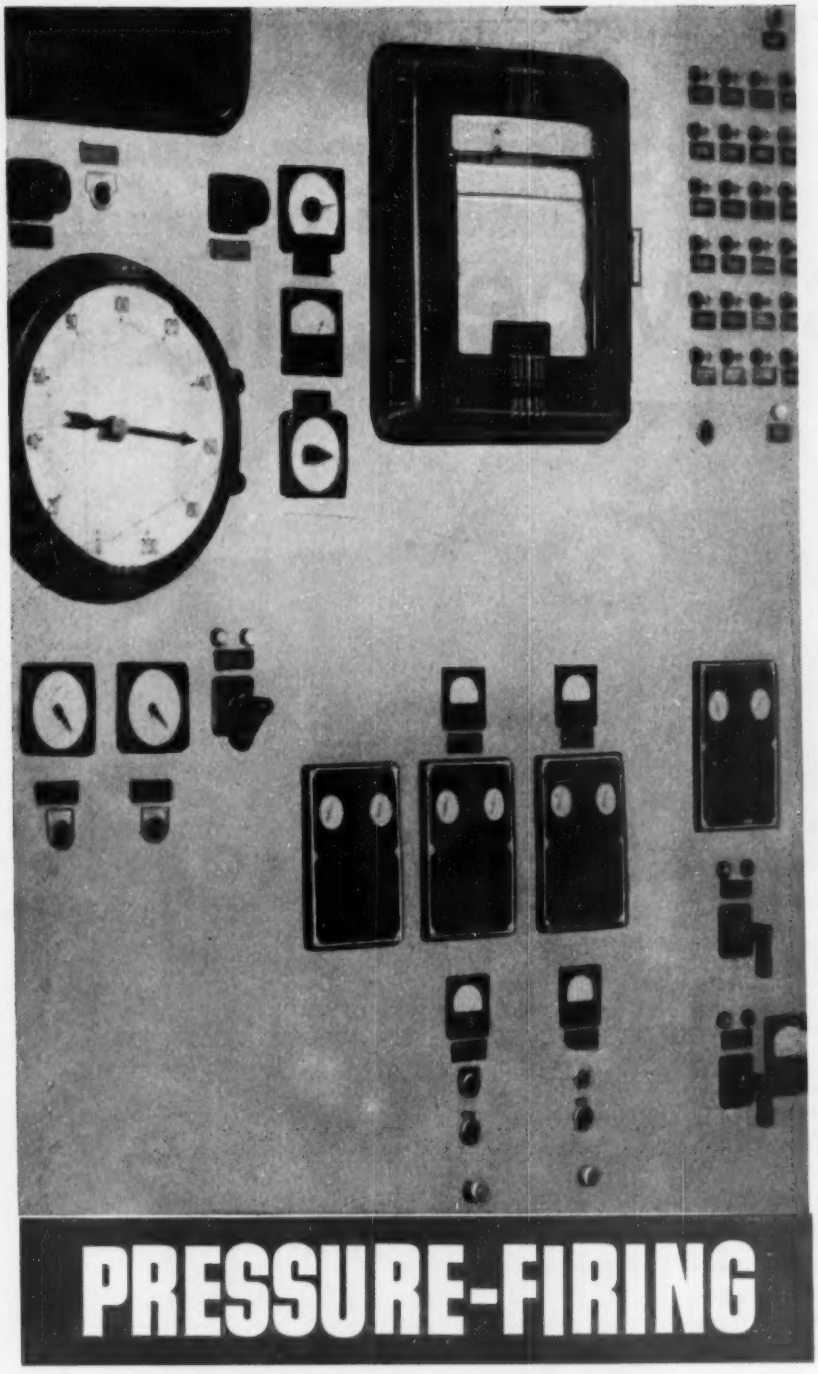
Many companies are currently enjoying substantial dollars and cents benefits through the use of pressure-fired units.

While engineers had long recognized the advantages that would result from all-forced-draft, pressure-fired boiler operation, overcoming the obstacles that blocked the development of actual pressure-tight units was an engineering achievement of major proportions. And the fact that today some of the largest coal-fired units ever operated have no induced draft fans is the strongest possible indication of the success and acceptance of B&W's pressurized-furnace design.

Sixty-five B&W Pressure-Fired Boilers—many with operating records spanning several years — now serve a total generating capacity of more than 5,500,000 kw, in power plants across the country. Fifty additional B&W units to serve another



PRESSURE-FIRING

B&W
Pressure-Fired Boilers
For a Total Generating
Capacity of Over

10,500,000 KW

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Arkansas Power & Light Co.
Central Louisiana Electric Co.
Central Power & Light Co.
City of Jacksonville
City of Lansing, Mich.
City Public Service Board, San Antonio
Commonwealth Edison Co.
Consolidated Edison Co. of N. Y., Inc.
Dallas Power & Light Co.
El Paso Electric Co.
Houston Lighting & Power Co.
Indiana & Michigan Electric Co.
Indiana-Kentucky Electric Corp.
Jersey Central Power & Light Co.
La Electricidad De Caracas
Ohio Edison Co.
Ohio Power Co.
Ohio Valley Electric Corp.
Oklahoma Gas & Electric Co.
Philadelphia Electric Co.
Public Service Co. of New Mexico
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5,000,000 kw of generating capacity, are being built.

If you are interested in pressure-firing, we will be glad to discuss detailed performance records of the many units now installed. Their day-to-day operation under a variety of fuel and load conditions will indicate clearly the long range availability and savings possible with this type of unit. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, New York.

BABCOCK & WILCOX
BOILER DIVISION

G-670

Cuts cost per service call

Nine models with Service-Utility bodies. 77-in. body lengths for 115-in. wheelbase models, 89 and 96-inch lengths for 127 and 134-inch wheelbase models respectively. GVW ratings, 4,200 to 8,600 lbs.

Here's the truck that lets you "take the shop to the job"—to complete almost any service job in just one trip. INTERNATIONAL Trucks with Service-Utility bodies make it possible to make more calls per day, to cut costs on *every* call.

The body is designed with big-capacity locking side compartments of varying sizes for storage of all tools and parts, with built-in bins, trays and shelves to keep them orderly and ready to use. Pipe supports, vise brackets, ladder racks and other specialized equipment also available.

You can choose the truck that's exactly suited to your specialized needs. And like every INTERNATIONAL, it will be *all-truck*, and Tough-Job engineered for dependable, low-cost operation, and long life.

Let your INTERNATIONAL Dealer or Branch show you the *right* truck to cut costs on every service call. Your trade-in may cover the down payment. Convenient terms arranged.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

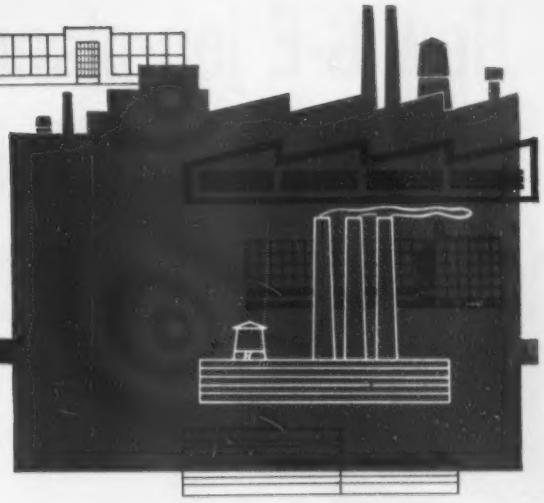
International Harvester Builds **McCORMICK**® Farm Equipment and **FARMALL**® Tractors . . . Motor Trucks . . . Industrial Power . . . Refriggerators and Freezers

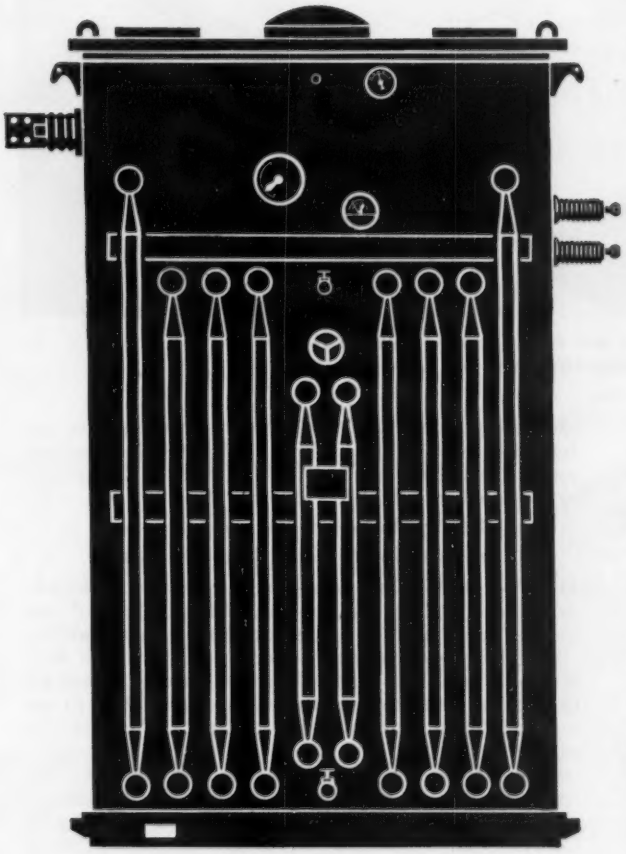
Better roads mean a better America

INTERNATIONAL® TRUCKS

"Standard of the Highway"

KUHLMAN *SAF-T-KUHL* TRANSFORMERS GIVE SAFER, LOWER-COST PERFORMANCE





Kuhlman Saf-T-Kuhl Transformers are filled with a patented synthetic cooling compound that is equal or superior to oil in di-electric strength, fluidity and thermal capacity. Yet the coolant is inert, non-explosive, non-inflammable and it will not sludge. The advantages of any unit employing such a coolant are well known.

- Saf-T-Kuhl Transformers can be installed anywhere in the plant without the use of expensive fireproof vaults.
- Voltage regulation can be improved and energy losses reduced by installing Saf-T-Kuhl Transformers near load centers and the expense of running long and large copper conductors can be eliminated.
- Floor space can be utilized exclusively for production by installing Saf-T-Kuhl Transformers above or below floor level.
- Maintenance costs are lower because the coolant does not require filtering or reconditioning.
- Insurance rates are lower in most states because Saf-T-Kuhl Transformers are absolutely safe and fireproof.

Saf-T-Kuhl Transformers are especially engineered to meet the requirements of heavy duty industrial service. The entire insulation structure is coordinated with the basic impulse level. Assemblies are thoroughly dried, and the coolant is introduced under vacuum to prevent entrapment of air and insure high insulation strength. Large ducts permit free circulation of the coolant to eliminate the danger of hot spots. Tanks are completely sealed. Cover and bushing gaskets are made from a special cork and synthetic rubber compound that gives exceptionally long life.

Kuhlman Saf-T-Kuhl Transformers are produced in a wide variety of single and three phase ratings. For complete information, write today for Bulletin CS-501. Kuhlman also manufactures, Power, Distribution, Dry Type, Subway, CSP and Series Street Lighting Transformers. Ask for bulletins on these units as well.

154-T

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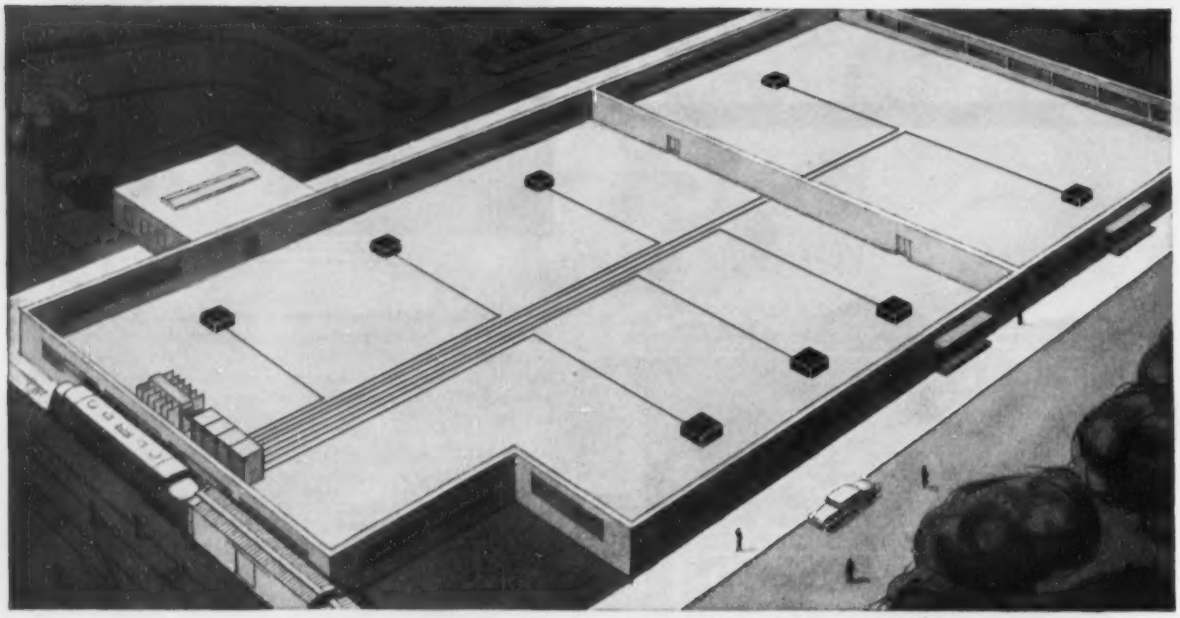
SIXTY YEARS OF PROGRESS IN THE ELECTRICAL INDUSTRY

How G-E job-planned power systems can help maintain plant efficiency



WHEN INCREASING LOADS CALL FOR A NEW POWER DISTRIBUTION SYSTEM — G-E WIRE AND CABLE WILL GIVE IT THE VERSATILITY NEEDED FOR FUTURE EXPANSION.

The continuing development of new electrical equipment, processes, and materials handling methods doubles the use of electricity approximately every ten years — according to the findings of qualified authorities. This means that you may need a new or expanded distribution system to handle these greater loads efficiently — because the unstable voltages that result from overloads increase distribution and equipment maintenance costs, and result in outages, faulty operation of equipment, and interrupted production.

A General Electric job-planned cable system is designed and coordinated to maintain plant efficiency by accommodating growing and changing load requirements. And G-E cables will keep your installation costs to a minimum, too.

Here are some examples:

85 C Super Coronol* cable provides overload capacity

G-E Super Coronol cable's normal rating (85 C up to 8000 volts) and its emergency rating (up to 115 C depending on voltage) give you reserve capacity for handling growing loads. This cable, used for lead-ins and cable feeders, can be buried directly in the ground or installed in conduit or ducts.

G-E interlocked armor cable system provides for changes in plant layout

G-E V-c interlocked armor cable primary or secondary feeder systems can be installed quickly, and can easily be expanded or relocated to accommodate changes in load patterns — because each circuit is a separate, flexible cable that needs no conduit. Planned G-E cable systems are of growing importance to an industrial plant, and can have a major effect on the plant's efficiency. So, when you have to handle increasing loads, let your G-E wire and cable specialist help you with the planning. For more information on G-E cable systems, write Section W127-927, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

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Snap the Arc—

ARC RESTRICTOR

1. Quick-Break, flexible horn restrained as blade opens to point beyond safe open gap distance — then snaps so fast that arc does not visibly occur.
2. Will successfully interrupt line-charging and transformer magnetizing current up to 15 amps.
3. Available for any standard switch—vertical or side break—already existing or on new R&IE switches.

SWITCH LINE CHARGING and/or TRANSFORMER MAGNETIZING CURRENTS Easily, Safely with the

R&IE SWITCH ATTACHMENTS

Write for Technical Paper 1346 F, or ask about our motion picture test record

R&IE EQUIPMENT DIVISION
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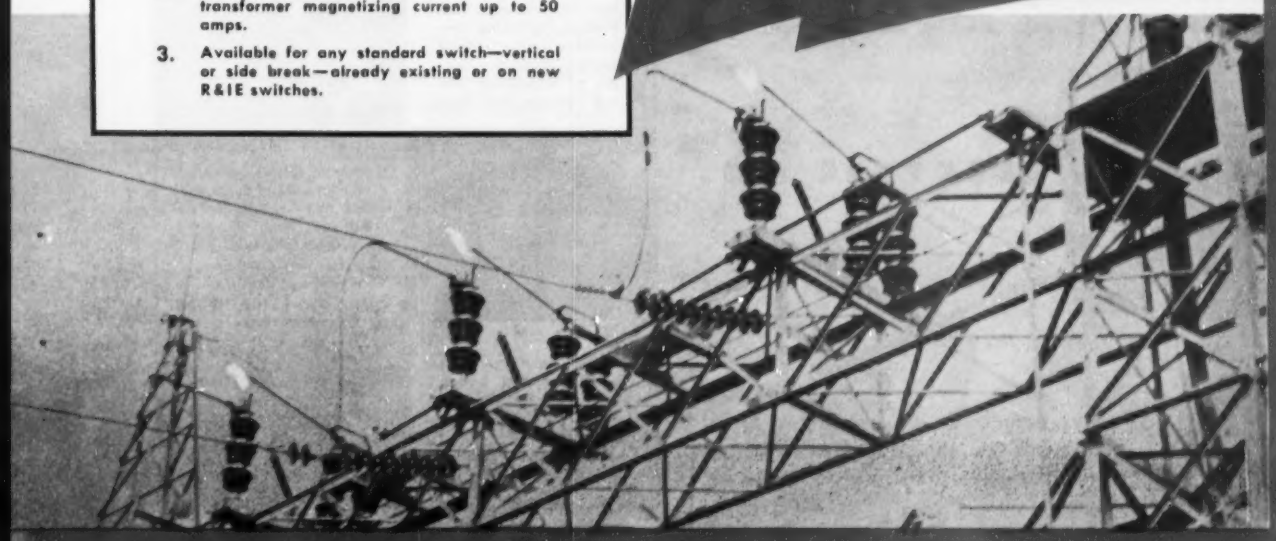
GAS BLAST

1. Blast tube directs jet of nitrogen or compressed air at points where switch horns part. Blast cools and destroys forming arcs.
2. Will successfully interrupt line-charging and transformer magnetizing current up to 50 amps.
3. Available for any standard switch—vertical or side break—already existing or on new R&IE switches.

or Blast it!



STRUCTURES—steel or aluminum ● TESTING DEVICES ● KIRK KEY INTERLOCK SYSTEMS ● ISOLATED PHASE BUS STRUCTURES ● INTERRUPTER SWITCHES

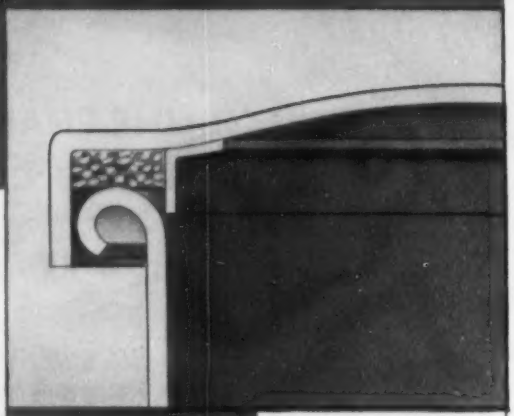
INDOOR BUS SUPPORTS and BUS FABRICATION ● OUTDOOR BUS SUPPORTS and AIR SWITCHES ● SUBSTATION

SEAL OF APPROVAL

Moloney HiperCore Distribution Transformer sealed-tank construction has won the seal of approval from operating engineers. No air or moisture can enter . . . greatly increasing life of oil and insulation. To assure this perfect, lasting seal which protects these HiperCore Transformers, Moloney uses a resilient Corprene gasket that is held in place by a welded-in retainer ring. Corprene makes a positive seal . . . impervious to oil, gas, moisture . . . it conforms to tank top and lip contours. Though tightly compressed to make a leak proof seal, the uncemented gasket retains resiliency for years . . . can be reused if ever required.

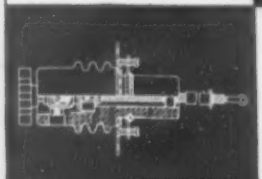
Part by part, Moloney HiperCore Transformers offer you "dependable service," . . . the mark of Moloney equipment for 58 years.

MEEK-20



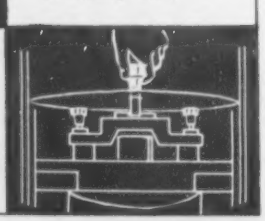
Tank base bonded to shell by continous seam weld to protect against handling and weather. Inside edge coated with sealing mastic and rolled in to form lasting barrier against moisture, air and rust.

Low voltage bushings keyed to fit into notched hole in tank wall, thus lineman, tightening connections cannot rotate bushing, eliminating danger of accidential contact between "hot" lines.



Moloney sidewall mounted high voltage bushings are provided with a molded, high impact resistant phenolic-cold rubber protective cap for working "hot".

Tap changer operating handle located above hot oil level. Double-moving contacts snap into position with a wiping action to assure positive contact.



MOLONEY ELECTRIC CO.

Power Transformers • Distribution Transformers • Step Voltage Regulators • Regulating Transformers • Load Tap Changing Transformers • Load Center Transformers • Unit Substations • Network Transformers • Constant Current Transformers • Capacitors Transformers For Electronics

SALES OFFICES IN ALL PRINCIPAL CITIES
FACTORIES AT ST. LOUIS 20, MISSOURI
AND TORONTO, ONTARIO, CANADA

EDITORIALS

1955—another big year

Forecasting the growth of the electrical industry has defied the most astute and also the most optimistic among those who have attempted this hazardous occupation. The safe methods of forecasting have used the minimum and maximum long-range trend providing a band of ample latitude to cover industry growth at various rates. On the whole, long-range forecasts of the industry's growth based upon historical trends have tended to be lower than the actual growth.

However, in passing, it should be pointed out that there is no evidence to prove that the industry has ever underestimated to any substantial degree its requirements for capacity additions.

The long range ten year forecasts in recent years have often been low because no one has had the foresight to visualize the increase in business activity which we have subsequently experienced. The importance and acceptance of electrical living have been underestimated in terms of the resulting increased use of electrical energy. One of the basic factors has been the continuous excess of population growth over predictions even one year old. This population increase has stimulated home and commercial building. And such activity has been reflected in almost all areas of business. In addition we have had the stimulant of the military preparedness program and the Korean war. More recently we have experienced the effects of general confidence in our economy growing out of sound government.

Taking these conditions into consideration, Electrical World presents in this issue (p 119) its annual forecast of growth in the electrical industry. This year's data bring our figures up to date and in line with present population, home building, and business forecasts. For the next few years our estimates are substantially the same as those presented last year. Methods developed for estimating the use by various classes of customers have been refined.

The output of electrical energy will be up a little over 6% in this recession year of 1954. With the small gain in business activity expected in 1955, electrical output will revert to its recent average growth of 8%.

The continued record growth rate of residential, rural, and commercial use of energy will create the need for even heavier expenditures for distribution facilities. A reduction in expenditures for generating equipment reflects the satisfactory reserve in most areas of the country. The generating capacity reserve margin may reach 25% in 1955 based upon winter peaks. The catching-up period has now ended, but an annual growth of 8% will still have to be provided for.

The most significant conclusion to be derived from our forecast is the fact that the electrical industry will continue to grow in 1955 and will increase by an increment that is very close to the record peak.

Premonitory Note on House Heating

If there are any electric utility managements that have not yet seriously considered electric house heating as a service they will be required to furnish, they had better start thinking about it now.

[There's a word the writer of this piece has been trying to work into an Electrical World editorial ever since he became acquainted with it. The word is "adumbrate" and it fits beautifully into the present discussion. Even an editor's life has its small satisfactions.]

What house heating will mean to the electric utilities—and probably sooner rather than later—is adumbrated by a couple of recent happenings. (In case any reader is not familiar with it, "adumbrate" means to foreshadow vaguely.)

Recently, and within a week's time, emissaries from two important publications of national circulation, called on Electrical World for information on electric house heating. Both are planning articles on the subject and are rounding up material for them.

Now, editors of magazines like these two are pretty shrewd people. They don't spend staff time and money to prepare articles just because articles are needed to fill pages between the advertising. They want articles on subjects they know will interest their readers. They have fixed on electric house heating as such a subject. That one editor should do so has a certain significance. That two do, and within the short space of seven days, does not mean that the significance is merely doubled. This kind of thing follows the square law at least; two such occurrences so close together indicate more than four times the significance.

[As he goes along composing this piece, the writer wonders if he is so pleased with "adumbrate" as he first thought. Maybe the two visits of seekers for information on house heating do more than foreshadow vaguely the future importance of that service in the utility scene.]

No doubt about it, public interest in electric house heating is increasing. Utility managements cannot afford to ignore that increasing interest for very long. If they do, they may be confronted by a demand they are not prepared to meet—and that will be bad for them.

[Now at the end, it seems that "adumbrate" was not such a happy choice. Probably it would have been better to use a word like "tocsin" which means a warning signal.]

Electricity Is Teaching Us to Loaf

One of the great contributions which the electric utility industry is making to the social progress of this country is to train the people to enjoy their leisure time. This may sound ridiculous, but not to the gerontologists. They have long recognized that one of the greatest barriers faced by persons reaching retirement is a psychological one. The elderly are often terrified by the thought of having nothing to do, of being compelled to loaf.

Behind this terror is a logical explanation. Men reaching retirement today went to work in the first decade of this century or soon after. For years most of them worked 12 hours a day, six days a week with no vacations. Most jobs required great physical effort. The result was that any leisure time available was spent in sleep or resting. These men were in their forties, some in their fifties, before the eight-hour day, paid vacations, and industrial applications of electricity made it possible for them to enjoy their leisure time. For many this was too late to overcome the "work-all-the-time" mode of living acquired in their youth.

The man in his twenties today is growing old in a civilization in which leisure is commonplace because of the great benefits in labor saving made possible by the application of electrical energy. When he reaches 65, leisure will hold no terrors for him because, thanks to electricity, he is mastering it now.

The Gas 'Giant' Is Aroused

Outraged, indignant, and alarmed, too, by the penetration of electricity into their innermost citadel, the gas boys spring to the defense in wild excitement. That is the impression the true believer in electrical progress gets from reading the story, "Gas Giant's Effort to Halt Electric-Stove Gain Highlights a Fuel Battle," in the Sept. 9 issue of the Wall Street Journal.

Until now, in complacent assurance that electric cooking could not get very far in their area of abundant, high-BTU, low-cost product, the gas utilities of the Southwest suddenly have realized that the enemy is firmly entrenched in their camp. In the territory served by the "gas giant," United Gas Corp, electric cooking has made notable gains. Of all kitchen ranges in the Houston area 15% are now electric as against only 3% seven years ago. In the Beaumont area and in the Mississippi division of the corporation electricity has chewed even deeper into the gas business, now being used in 25% and 20% of kitchen ranges respectively, in comparison with 5% in each case in 1947.

So, relates the news story, the nation's largest gas utility girds up its loins and goes forth to battle. It put a 14-man sales caravan on the road in an 18-day, 1,700-mile tour covering 12 cities in Texas, Louisiana, and Mississippi. It seems that appliance dealers have been inclined to relegate gas ranges to the backs of their stores which, with its implication of restrained enthusiasm, is not a big help in selling them. The free dinners, the pep talks, and the general hoop-la of the caravan meetings and the elaborate sales campaigns initiated by them are designed to bring the gas ranges up to the fronts of the stores with attendant tonic effect on heretofore debilitated sales effort.

No doubt the electric utilities of the area will be happy to see their competition aroused to spirited sales activity from sluggish dependence on the argument that gas is cheaper. Neither much fun nor great profit comes from contending against an opponent who never takes the offensive because he feels certain his position is impregnable. Now with the gas boys awake and on the prowl, those on the electricity side will be inspired to even larger enterprise, and the people of the Southwest will benefit. Electric utilities too should benefit by knowing the electric range can be sold anywhere.

THE ELECTRICAL WEEK

The Issue's News Highlights . . . Two-eyed Hurricane Edna ripped into New England and Canada and deprived about one million persons of electric power. AEC aides are confident Dixon-Yates power deal will get "green" light.

Aluminum's Big 3 get ready to sign with BPA for an 18-year power contract.

BPA halts work on 345-kv line near McNary Dam.

Tennessee Valley is experiencing a severe and prolonged water shortage but there is no imminent danger of a power shortage for the area, TVA told EW last week. Hydro production by Alabama Power for first eight months of 1954 is 30% below a year ago while Georgia Power was down 16% in same period, a Southern Co official reported.

USBR has completed studies of $230 million San Luis reclamation development, Central Valley Project's newest proposed unit. It would use 700 million kwhr per year to pump surface water to 500,000-acre region. Power would come from CVP plants at Shasta, Keswick, Nimbus and possibly Trinity River.

Revenue bond issue of $190,000 to provide for municipal ownership of electric distribution system in Breaux Bridge, La., was defeated overwhelmingly in Sept. 7 election. City is presently served by Central Louisiana Electric whose franchise expires in December.

IES Technical Conference HiLights . . . Duncan M. Jones, eastern Canada representative of Curtis Lighting of Canada, Ltd., Montreal, was elected president of Illuminating Engineering Society . . . Dr Erwin F. Lowry of Sylvania Electric Products, Inc, received IES 1954 gold medal for his work in fluorescent lamp development.

Signing of a new two-year contract three hours before strike deadline averted a midnight walkout on Sept. 10 by 42,000 Westinghouse Electric workers. Members of IUEW-CIO will get wage hikes averaging about 5¢ an hour plus increased pensions. Westinghouse also boosted weekly salaries by $1.40 to $2.80 along with increased pensions for 15,000 white collar workers in independent salaried unions.

More than a trillion kwhr will be produced annually in U. S. by 1964, William F. O'Brien, vice president of GE, predicted at Rocky Mountain Electrical League meeting in Estes Park, Colo., last week. By 1964, he said, there will be 54 million homes averaging more than 5,000 kwhr a year. He forecast turbine generators of 450,000 kw by 1964, with even larger units in the planning state by that time. Best generating station, he pointed out, will require only .65 lb of coal to produce a kwhr.

Off the Washington Wire . . . AEC Commissioner Henry D. Smyth will resign Sept. 30 to become chairman of board for Scientific and Engineering Research at Princeton University. His replacement will be Dr Willard Frank Libby, professor of chemistry in Institute for Nuclear Studies at University of Chicago.

Copies of new atomic law (Public Law 703, 83rd Congress) are now available from Superintendent of Documents, Government Printing Office, Washington 25, D. C.

First proposals for revision of its rules governing registration and offering of securities under recent amendments to federal securities laws, have been announced by SEC. It has invited submission of views by Sept. 27. Effective Oct. 10, amendments permit making of written offers to buy during the waiting period through preliminary prospectuses filed with SEC prior to their use.

Carl Vernon Youngquist, chief engineer, Ohio Water Resources Board, was made consultant staff director of President's Cabinet Committee on Water Resources Policy headed by Interior Secretary McKay.

U. S. Air Force studies of limiting effect of weather on operation of 11 major U. S. industries, including electric utilities, are available in microfilm and photocopy form from Library of Congress, Publication Board Project, Washington 25. Summary report (PB 113882) gives in condensed form findings and conclusions for each industry studied in overall report, "Climatic Criteria Defining Efficiency Limits for Certain Industrial Activities." Report on "Climatic Limitations to Electric Power Utilities" (PB 113893) costs $3 microfilm, $7.75 photocopy.

British Columbia government has agreed to provide Puget Sound Utilities Council with information of application of Canadian laws to proposed $425 million hydro project on Columbia River at Mica Creek north of border. Dam would add 1.2 million kw to firm power capacity of U. S. dams downstream at Grand Coulee, Rock Island, Bonneville, etc.

Executive Changes . . . Union Electric of Missouri elected Ralph E. Moody chairman of board and Dudley Sanford executive vice president. Pres J. W. McAfee also announced George P. Gamble was promoted to vice president in charge of operations, and G. V. Williamson became a vice president to take over Gamble's former duties in charge of production and distribution . . . Southern California Edison elected H. W. Tice senior vice president and James F. Davenport vice president and general manager . . . John T. Kimball will become vice president and general manager of Idaho Power on Oct. 1, leaving his post as executive vice president of Arizona Public Service.

BEFORE . . . Edna hit, Narragansett sandbagged its plants

AFTER . . . Edna came, Boston Edison crews restored service

AND NOW . . . Outside linemen arrive to help with clean-up

Utilities Cope With Edna After Scrape With Carol

After sideswiping the middle Atlantic seaboard, Hurricane Edna screamed into New England and Canada leaving behind it an estimated one million persons without electric service.

But preparedness paid. The much-publicized weather blast, which killed at least 19 people and ran damage into the millions, still did not wreak all the havoc on utilities of which it was capable. Wise to the ways of women after their experience with Edna's sister Hurricane Carol, 11 days earlier, utilities in most of the stricken areas had crews in readiness before the storm hit. And in many instances the utilities called in other crews from the outside.

Southern Maine Hit Hard . . . Hardest hit were the southern Maine, and eastern Massachusetts areas. New Brunswick and Nova Scotia got some of it too before the hurricane blew itself out over the Gulf of St. Lawrence. Connecticut and eastern Long Island also sustained considerable damage, but not to the extent of the earlier Carol. Consolidated Co of New York, Inc, reported insignificant damage in its New York City-Westchester service area. Most New Jersey utilities, with the exception of Atlantic City Electric Co, where damage was said to be minor, reported little or no trouble.

It wasn't until Edna crossed lower Cape Cod and split in two that she began her heaviest rampage of ruin. Boston Edison Co, with power interrupted to 175,000 of its 450,000 customers, put 800 linemen in 52 crews (about half of them from outside the company) into the field. Some 300 of its distribution poles were destroyed. Cape & Vineyard Electric Co outages affected 25,000 of its customers. New England Electric system had 90,000 out but reported damage was held to $300,000 compared with $2 million from Hurricane Carol. Eastern Utilities Associates reported that 50% of its member companies' customers were out at one time.

In Maine rivers were in flood stage and high water filled downtown Augusta and other areas. Central Maine Power Co had 1,200 linemen, one fourth of them borrowed from other companies, battling to restore service to 80,000 customers of its total 230,000. About 1,100 distribution poles were down.

Bangor Hydro-Electric Co had as many as half of its electric customers out for a short time and Public Service Co of New Hampshire reported 30,000 without electricity and a $150,000 loss. Maine Public Service Co, which covers northern Maine and parts of New Brunswick in Canada, said intermittent outages affected about 25% of its users.

Carol Hit Harder . . . Connecticut, Rhode Island, and Long Island were not quite so hard hit by Edna as they had been by Carol. Nevertheless, the New London Division of Connecticut Power Co had 25% of its customers out, and Narragansett Electric Co, serving in Rhode Island, 20%. Connecticut Light & Power Co also reported another 82,000 customers were without service along the shore and eastern sections, but it was back to normal within 48 hours.

Hartford Electric Light Co and United Illuminating Co had interruptions to 7,500 and 10,000 customers respectively, but neither experienced the trouble it had anticipated. Connecticut's Public Utilities Commission reported its ten-point plan with the state's electric companies for handling storm interruptions (EW, Aug. 3, 1953, p 19) "worked very well" during the emergency.

Long Island Lighting Co, another old veteran in the hurricane wars, worked exceptionally fast in order to restore service to 75,000 of its customers.

Transmission and distribution facilities suffered heaviest damage over the storm area. Generating plants and substations generally were little affected. Boston Edison and Bangor Hydro reported the only known instances: Water in several of Bangor's small-stream plants and a roof blown off a coal conveyor at the Boston Edison steam plant.

Figures Are in Error, von Tresckow Declares

Atomic Energy Commission and Bureau of Budget figures in the Dixon-Yates proposal are "inaccurate and misleading," Walter von Tresckow said last week in a letter to Rep W. Sterling Cole (R-N. Y.), chairman of Joint Congressional Atomic Energy Committee.

He pointed out that "by eliminating 98 AEC errors we find that it will cost $5,151,000 less per year to do business with us than with Dixon-Yates."

Von Tresckow is head of a syndicate which competed with Dixon-Yates to supply AEC's Paducah, Ky., operation with 600,000 kw of power. Among those associated with von Tresckow are Burns & McDonnell Engineering Co, Long Construction Co, and Salomon Brothers & Hutzler.

Expect Dixon-Yates Approval

AEC Chairman Strauss and General Manager Nichols express confidence the power contract will get go ahead signal

Atomic Energy Commission Chairman Lewis L. Strauss and AEC General Manager K. D. Nichols, who have pushed the Dixon-Yates power contract hard from the beginning, are confident the deal will go through, possibly this week.

They said so during the first press conference conducted by AEC since ex-Admiral Strauss took over last year.

Timing May Be Off . . . Word from TVA lends support to this feeling, although the timing may be a little off. Taking into account the grim silence surrounding the offices of two TVA directors, Curtis and Paty, who had objected strenuously to the contract from the start, the time estimate advanced by Strauss and Nichols may turn out to be somewhat premature.

TVA sources said last week their staff members had met twice recently with AEC staffers in Knoxville, Tenn., to "identify matters for detailed consideration later." These were understood to be chiefly engineering subjects, indicating that technical details constitute chiefly the major points of discussion included:

- AEC-TVA staffs scheduled their next meeting for Sept. 27. They were to discuss the engineering matters pinpointed at their earlier meetings.
- Democratic National Committee Chairman Stephen A. Mitchell once again roasted the Administration for its role in ordering consummation of the contract, this time at a North Carolina political rally. Mitchell implied that Budget Director Rowland R. Hughes had ramrodded the deal past the President, telling Eisenhower only information favorable to Dixon-Yates, and convincing him on the basis of this incomplete data to back a Budget Bureau directive to get the arrangement in legal form.
- Nichols said TVA will pay extra costs involved in buying power from Dixon-Yates' proposed $107-million, 600,000-kw plant near West Memphis, Ark. He said when the contract is signed, AEC's existing contract with TVA for power at the Paducah (Ky.) atom plant will be adjusted, with a reduction in AEC's call on TVA to correspond to the amount of electricity put into the TVA system at Memphis. All similar adjustments, according to Nichols, will be made "only where TVA benefits."

Coal Cost Disputed . . . One such "adjustment"—disputed by TVA Directors Curtis and Paty as not benefitting TVA—concerns the added cost of coal needed for a steam plant in the Memphis area. Coal costs more there than farther north, nearer the Kentucky coal mines. Therefore, TVA, as well as Dixon-Yates, would pay more for coal delivered to a Memphis area plant than it would for a plant nearer Paducah. The Strauss-Nichols team reasons that TVA should, therefore, be required to foot the bill for more expensive coal.

TVA's argument is that it can buy coal in the Memphis area cheaper than Dixon-Yates can obtain it. Nichols does not agree.

Other statements made by Strauss and Nichols:

- Neither Strauss, former Budget Director Dodge, nor Hughes knew Dixon or Yates prior to the suggestion that private power be solicited to supply new needs in the TVA area.
- AEC did not open the deal to competitive bidding because of the cancellation feature involved. Strauss said no one would risk a contract involving a cancellation clause of this type, unless he had an alternate use for the power. Therefore, he said, the logical source of the new power was a utility in the area concerned.
- The historic TVA yardstick "is not modified one iota" by the Dixon-Yates contract. Nichols said this is because TVA costs of running a steam plant near Memphis would be similar to Dixon-Yates costs.

Strauss said he did not anticipate any further "headaches" when the contract has been signed. Apparently, he foresees no trouble in getting joint committee approval of his request to waive the waiting period.

The Joint Congressional Atomic Energy Committee has not yet rescheduled its postponed hearing on the matter. Staff members said the committee is waiting until the AEC-TVA conflict has been resolved.

Former AEC Commissioner Zuckert warns . . .

ATOM BLINDS INVESTORS TO TODAY'S MONEY NEEDS

Prospective investors in the atomic energy field have been warned not to become so intrigued with the new industry that they forget their duties—and profits—in competitive ventures.

Former Atomic Energy Commissioner Eugene M. Zuckert, whose term expired June 30, put it this way:

"It would be a tragic irony if some of our industries lacked needed capital because of hesitation induced by an over-optimism about the speed with which atomic energy would obsolesce existing processes."

Zuckert was making his first public address since leaving office. He spoke to the Savings Bank Association of Massachusetts at Bretton Wood, N. H.

Lauds 3 Atomic Developments . . . A Truman appointee named in 1952 to fill the unexpired term of Sumner Pike on AEC, and an opponent of some of the Eisenhower Administration's policies, Zuckert nevertheless chose the occasion to pay tribute to three developments in the field of atomic energy for which the Administration is directly responsible:

- AEC's decision to build the first large scale reactor for production of electric power.
- President Eisenhower's share-atomic-secrets plan to aid friendly nations.
- Congressional approval of new atomic legislation to implement the President's plan to provide the basis for a new atomic industry.

These accomplishments have made the year "momentous" for atomic energy, Zuckert declared, but they merely set the stage for development of the industry. To date, atomic energy activity has involved successful functioning of unique forms of partnership, and Zuckert foresaw problems inherent in these partnerships becoming much more difficult as industrial applications and participation in atomic energy increase. He stressed the fact that government supervision must continue, on a state or federal level, because of the inherently dangerous radiation aspect.

Cites Heat-Resistant Alloy Need . . . Zuckert also spoke of the tremendous possibilities with regard to new sources of raw chemicals which may come about as a result of current work on decontamination of coolants, particularly water, used by atomic reactors. He spoke of the infant industry's need for more and better high-temperature alloys, saying success in this field will have a direct bearing on the efficiency of utilization of all our fuels.

Throughout his discussions of each of the "headaches" facing the atomic industry Zuckert wove notes of optimism concerning the benefits derived in solving these problems. Typical of his reporting was this:

"One problem of the submarine was to build a steam plant operating with an atomic reactor and under a combination of rigorous conditions never before encountered. The result is startling developments in heat exchangers, valves, and pumps as well as great strides in metallurgy, including the use of liquid metals. The necessities of the atomic submarine and our production reactors have created new techniques of instrumentation and remote control which are finding their use in industry."

Illinois Co-ops May Seek 150,000-Kw Plant Loan

Illinois Statewide Power Co-operative is considering an application for a Rural Electrification Administration loan to construct a $20 million, 150-000-kw generating plant in southern Illinois. Composed of a group of 13 Illinois cooperatives, the ISPCO has invited two private utilities—Central Illinois Public Service Co and Illinois Power Co—to join them in the plant studies.

The co-op group would like to get the REA funds at 2%, build the plant and then lease it to the private companies with its output earmarked for co-op use.

Basis for the loan, according to Roy Zook, REA's assistant administrator, would be to assure the co-ops a source of power. He explained the proposed plan at a recent convention of the Association of Illinois Electric Co-operatives in Springfield.

Big Northwest Power Gamble

Aluminum's Big 3, hoping for good water years, get ready to sign risky, but profitable BPA power contract

The big three aluminum producers are gambling on power again in the Pacific Northwest—this time for the long run.

With one successful experience behind them, and the prospect of a more-than-favorable water year facing them this year, Aluminum Co of America, Kaiser Aluminum & Chemical Corp, and Reynolds Metals Co are ready to sign a risky 18-year contract with Bonneville Power Administration involving withdrawal of reserve water early in the year to keep aluminum production rolling. Risk is in low water during the last part of the winter—in which event all power is cut off.

Last year, Alcoa, Kaiser, and Reynolds gambled for the first time that reserve water they used for power during the first half of the water control season would be replenished by at least normal rains and snowfalls. It worked—so well, in fact, that a contract is in the works this year.

The deal last year was performed during a winter of decent rainfall, but it was a calculated risk in the (government) sense of the word because of the extremely dry winter experienced just the year before.

This year, the prospect is much improved. Water conditions in the Northwest are described as the most favorable on record, with reservoirs brim-full and rain prospects good.

Then, too, the odds favor the aluminum giants. Only one out of 20 years is bad for rain, records show.

Still A Gamble . . . Nevertheless, the fact that the firms are gambling exists. If they win, they'll be able to keep their multi-million dollar plants operating full throughout the winter at a power saving. And BPA, which controls reservoir levels to be tapped under the arrangement, stands to make more in revenues.

But if the companies lose—if rainfall drops and it's found the reservoirs can't stand being drained to supply water for industrial power without cutting into municipal supplies—the aluminum producers take a chance on having their power halted altogether in the last part of the winter. This would bring aluminum production to a crawl, and probably cost the big firms huge financial losses.

'Interruptible' Power Is Key . . . The deal revolves around the fact the aluminum companies receive "interruptible" power. Kaiser uses interruptible for one Tacoma plant potline and three at Spokane. Alcoa uses it at Wenatchee. And Reynolds uses it at Longview. These would be first cut in event of lower-than-average rainfalls reducing reservoir levels below the minimum set by BPA.

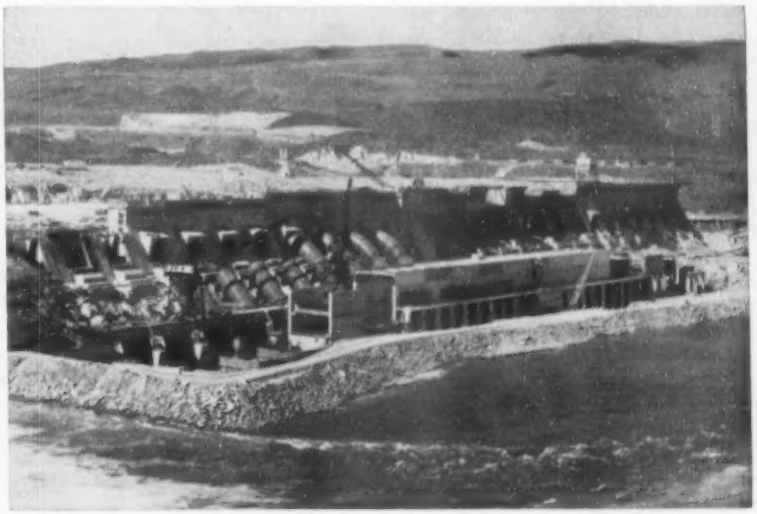
If the companies get their power, and a shortage develops, their supplies would be cut off, per the agreement, as repayment for the reserve water they drew off during the first half of the year. Either that, or they would be required to replace an equivalent amount through purchase from other sources—at far more than they get their power from BPA.

A new feature of the long-term contract will be that any one of the companies will be permitted to drop out, or modify its agreement with BPA. BPA will be committed each year.

Additional Steam Power Called Need in Northwest

A need for an estimated million kw of steam-generated power, in addition to the power now available from that source, will exist in the Pacific Northwest under low-water conditions by 1963, according to a preliminary report of the Washington State Power Commission's engineering staff. The staff is studying proposed steam plant costs.

Should a dry year occur before 1960, some industrial power may be cut off unless additional steam power is available, said J. Frank Ward, managing director of the commission.



Chief Joseph Powerhouse Nearly Ready

The 2,040 ft long intake structure for Chief Joseph powerhouse is nearly completed. Powerhouse is shown in foreground in this picture taken from across the Columbia River. Started two years ago under a $40-million contract between the Seattle District of the Army Corps of Engineers and Columbia River Constructors, the job now has passed the three-quarter mark. The powerhouse is 1,540 ft long to accommodate 20 generating units, although only 16 of the 64,000-kw generators will be installed under the present contract. Eventually the corps plans to extend the powerhouse to 2,036 ft for 27 generators with a combined power production of 1,728,000 kw.

Halts 345-Kv Line

BPA stops stringing between McNary Dam and Wishram, Wash., after 'difficulties'

Bonneville Power Administration has ordered a temporary halt in stringing of 345,000-v steel core aluminum strand transmission line conductor between McNary Dam site and Wishram, Wash. Technical difficulties in the operation, described as resulting in irregularities of cable surface, have developed and BPA engineers, representatives of the manufacturer, Aluminum Co of America, and the contractor's stringing foremen hope to work the "bugs" out of the operation in a week or ten days.

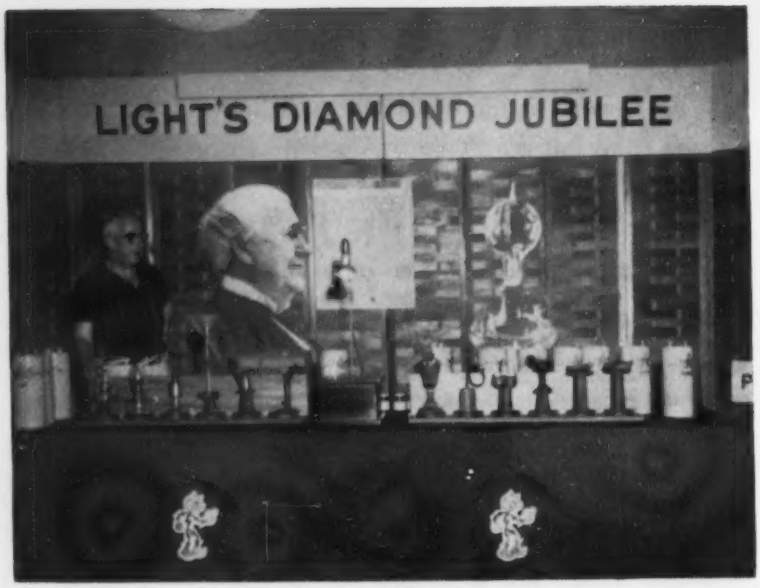
30 Miles of Line Strung . . . Some 30 miles of the 90-mile McNary-Wishram section of the extra high voltage line, believed largest in the nation, have been strung by Bay Construction Co, and Don L. Cooney, Seattle contractors, awarded an $890,762 contract for the work April 13. Bonneville Chief Engineer E. C. Starr reported Sept. 10 that it had been necessary to remove four 4,000-ft reels of the conductor already strung in order to inspect the surface and review all phases of the stringing.

"The McNary-Wishram project represents the first time Bonneville has used the new super high voltage 345,000-v conductor or supervised the stringing operations," Starr reported (EW, Sept. 13, p 30-32). "We expected some "bugs" to develop due to the new equipment and gear that had to be developed for the larger cable. We expect to have the technical difficulties solved and be rolling again within the next week or ten days.

"Due to the high voltage involved, representing over twice the power carrying capacity of existing 230,000-v lines, the degree of tolerance for any surface irregularities is extremely fine," Starr explained. "As a result extreme care must be exercised both in the stringing operations and manufacture to avoid even the slightest flare of conductor strands or other irregularities."

Isolated Areas No Problem . . . Flaring —or rises—in the aluminum strands results in sparking and glowing—corona—and severe radio reception interferences in areas along the line. Some sections already strung are isolated and pose no interference problems, a BPA spokesman said.

The conductor, about 1.6 in. in diameter, is manufactured by Alcoa in its Vancouver, Wash., plant, the first of its size by the company. An Alcoa spokesman reported everybody has been pretty apprehensive from the start, about the problems involved in its manufacture, and stringing. Only about one reel in seven has caused trouble, according to BPA, and the agency's engineers have been unable to determine whether the difficulty is in the manufacture or the stringing.



From Stone Lamp to Incandescent Bulb

The progressive development light sources from the stone lamp (at extreme right) 600 B. C., to Thomas A. Edison's first successful incandescent lamp, 1879, is described and demonstrated by H. F. Carroll, lighting engineer, Pennsylvania Power & Light Co. Demonstration was featured at the Industrial Sales Conference held recently at PP&L's Sweet Arrow Lake Club House, Pine Grove, Pa.

New EEI Home Wiring Booklet Available Oct. 1

The first Residential Wiring Handbook since 1946 will be ready for distribution about Oct. 1, Edison Electric Institute reports.

Completely revised and enlarged, the new 32-page edition updates home wiring standards to meet current requirements and those anticipated with future electrical growth. It also carries, for the first time, the endorsement of the National Association of Home Builders.

Handbook is being published by EEI under authorization from the Industry Committee on Interior Wiring Design. Other organizations which had a hand in its development include American Home Lighting Institute, International Association of Electrical Inspectors, National Association of Home Builders, National Association of Electrical Distributors, National Electrical Contractors Association, National Electrical Manufacturers Association, and Radio Electronics and Television Manufacturers Association. Endorsing organizations are the American Institute of Electrical Engineers, American Society of Agricultural Engineers, and Illuminating Engineering Society.

Copies will be available at the following prices: Single copies, 25¢; 10 to 99, 10¢ each; 100 to 999, 8¢ each; 1,000 or more, 6¢ each. Order after Oct. 1 from Edison Electric Institute, 420 Lexington Ave, New York 17, N. Y.

St. Lawrence Power

APPA's Alex Radin urges N. Y. State public power bodies to seek project's energy

New York State public power bodies have been urged by the American Public Power Association to get in on the ground floor while power from the St. Lawrence project is being assigned.

Alex Radin, APPA general manager, recently told the New York Municipal Electric Utilities Association at Cooperstown that municipalities may lose out on the new supply if they do not act quickly, because of the lack of a preference clause in the statutory authority for the project.

Dewey Scored . . . Radin took a crack at retiring Gov. Thomas Dewey as he addressed the group. He declared:

"Our elation at the beginning of construction of this project must be tempered somewhat by apprehension as to the manner in which this power will be marketed. Unfortunately, Governor Dewey continues to display hostility toward the municipal electric utilities and to a preference to such agencies in marketing the St. Lawrence power.

"His (Dewey's) most extreme and shocking statement in that regard was made on Jan. 14 of this year in an address in Albany before the New York State Publishers Association. Referring to the preference clause for municipal utilities, Governor Dewey stated: 'Actually, it amounts to a provision which says that if the State of New York is allowed to develop the water power which belongs to the people, it is obligated by law to offer that power first to those communities which bend their knees to the Moscow concept, abandon private operation of their public utilities, and socialize them.'

Radin said he understood New York association had already requested a meeting with New York State Power Authority Chairman Robert Moses as first step toward formulating its program. But he urged members to plan in terms of specific needs—i.e. how many kilowatts will be needed when, at what load factor, through what lines.

Interior's Davis Sworn in as Under Secretary

Clarence A. Davis, Interior Department solicitor since the Eisenhower Administration restaffed the agency, has been sworn into his new post as under secretary, replacing Ralph A. Tudor.

Davis' nomination was approved by the Senate before adjournment. He was not moved into his new post until after Congress quit, however, because Tudor had promised to stay until then.

Davis has been influential in formulating Interior's new power policies.

MEETINGS CALENDAR

INSTRUMENT SOCIETY OF AMERICA
1st International Instrument Congress-Exposition, Philadelphia, Sept. 13-24.

*** EDISON ELECTRIC INSTITUTE**
Accident Prevention Committee, Benjamin Franklin Hotel, Philadelphia, Sept. 20-21; Residential Promotional Committee Meeting, EEI Headquarters, New York, Sept. 27-28; Industrial Relations Committee, Round Table Conference, Palmer House, Chicago, Sept. 27-29; Meter and Service Committee, Leland Hotel, Springfield, Ill., Sept. 27-29; EEI-AGA Tax Committee, Brown Palace Hotel, Denver, Colo., Sept. 29-Oct. 1; Prime Movers Committee, De Witt Clinton Hotel, Albany, N. Y., Oct. 4-5; Claims Conference, Hotel Cleveland, Cleveland, Oct. 5-6; Area Development Committee Organization Meeting, Hotel Statler, Cleveland, Oct. 6; Area Development Workshop, Hotel Statler, Cleveland, Oct. 7-8; Transmission and Distribution Committee, Sir Francis Drake Hotel, San Francisco, Oct. 7-8; Electrical Equipment Committee, Hotel Statler, Hartford, Conn., Oct. 11-12; Commercial Division General Committee Meeting, EEI Headquarters, New York, Oct. 15; Industrial Relations Committee in conjunction with North Central Electrical Association, Minneapolis, Minn., Nov. 18-19; Prime Movers Committee, Astor Hotel, New York, Nov. 29-30; Industrial Relations Committee, EEI Headquarters, New York, Dec. 16; Industrial Relations Committee, EEI Headquarters, New York, Jan. 20, 1955; 1st Street Tree and Utility Conference, cosponsored with EEI Transmission and Distribution Committee and Street Lighting Committee of Illuminating Engineering Society, Wade Park Manor, Cleveland, March 3-5, 1955; Sales Conference, Edgewater Beach Hotel, Chicago, March 28-31, 1955; Annual Convention, Statler-Biltmore Hotels, Los Angeles, June 13-16, 1955.

*** INTER-INDUSTRY FARM ELECTRIC UTILIZATION COUNCIL**
Chairman, Fred H. Strong, REA Deputy Administrator. Meetings: North Central Area, Lowry Hotel, St. Paul, Minn., Sept. 21; Western Area, Shirley-Savoy Hotel, Denver, Colo., Sept. 28; Northeast Area, Deshler-Hilton Hotel, Columbus, Ohio. Oct. 12; Southwest Area, Texas Hotel, Fort Worth, Tex., Oct. 15; Southeast Area, Andrew Jackson Hotel, Nashville, Tenn., Oct. 20.

MISSOURI VALLEY ELECTRIC ASSOCIATION
Accounting Conference, Jefferson Hotel, St. Louis, Sept. 23-24; Sales and Rural Conference, President Hotel, Kansas City, Mo., Oct. 6-8; Industrial and Commercial Sales Conference, President Hotel, Kansas City, Mo., Feb. 3-4, 1955; Engineering Conference, President Hotel, Kansas City, Mo., March 23-25, 1955.

SOUTHEASTERN ELECTRIC EXCHANGE
Engineering and Operation Section, Thomas Jefferson Hotel, Birmingham, Ala., Sept. 23-24; Accounting Section, Roanoke Hotel, Roanoke, Va., Oct. 21-22; General Sales Conference, Roosevelt Hotel, New Orleans, La., Oct. 28-30; Accident Prevention Committee, Heidelberg Hotel, Baton Rouge, La., Nov. 11-12; Annual Meeting, Boca-Raton Hotel and Club, Boca Raton, Fla., March 21-23, 1955; Engineering and Operation Section, Roosevelt Hotel, New Orleans, La., April 7-8, 1955.

PUBLIC INFORMATION PROGRAM
Inter-Regional Committee, Blackstone Hotel, Chicago, Sept. 24; Annual Workshop Conference. Chase and Park Plaza Hotels, St. Louis, Oct. 27-29; Mid-Atlantic Region, Hotel Statler, Washington, D. C., Nov. 12.

ATOMIC INDUSTRIAL FORUM, INC
Meeting on "What the New (Atomic) Law Means", Hotel Plaza, New York, Sept. 27-28; Meeting on "Atomic Opportunities in New England", in conjunction with New England Council, Statler Hotel, Boston, Oct. 20.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
Committee on Petroleum, Conference on Electrical Applications in Petroleum Industry, Mayo Hotel, Tulsa, Okla., Sept. 27-29; Middle Eastern District Meeting, Abraham Lincoln Hotel, Reading, Pa., Oct. 5-7; Fall General Meeting, Morrison Hotel, Chicago, Oct. 11-15; Winter General Meeting, Hotel Statler, New York, Jan. 31-Feb. 4, 1955.

INSTITUTE OF RADIO ENGINEERS
Professional Group on Industrial Electronics and Pittsburgh Section of IRE, Symposium, Mellon Institute, Pittsburgh, Pa., Sept. 29-30.

INTERNATIONAL ASSOCIATION OF ELECTRICAL LEAGUES
19th Annual Conference, Bellevue-Stratford Hotel, Philadelphia, Sept. 29-Oct. 2.

NATIONAL ELECTRONICS CONFERENCE
10th Annual Conference, Hotel Sherman, Chicago, Oct. 4-6.

NATIONAL ASSOCIATION OF ELECTRICAL DISTRIBUTORS
Pacific Zone Convention, Mark Hopkins Hotel, San Francisco, Oct. 4-7.

INDIANA ELECTRIC ASSOCIATION
Annual Convention, French Lick Springs Hotel, French Lick, Ind., Oct. 6-8.

*** PENNSYLVANIA ELECTRIC ASSOCIATION**
Fall Meeting, Systems Operation Committee, Alexander Hotel, Hagerstown, Md., Oct. 7-8; System Planning Committee, Lehigh Valley Club, Allentown, Pa., Oct. 11-12; Fall Meeting, Relay Committee, Hotel Alexander, Hagerstown, Md., Oct. 14-15; Fall Meeting, Electrical Equipment Committee, Hotel Robert Treat, Newark, N. J., Oct. 19-20; Fall Meeting, Transmission and Distribution Committee, Alexander Hotel, Hagerstown, Md., Nov. 4-5.

CONTROLLERS INSTITUTE OF AMERICA
Annual Meeting, Edgewater Beach Hotel, Chicago, Oct. 10-13.

INTERSTATE POWER CLUB
Meetings will be held at Hotel Mar-

(*Continued on page* 192)

Speed Up

IEC JUBILEE SPEAKERS Pierre J. Ailleret, director of research, Electricite de France; Dr Hakan A. Sterky, director general, Sweden Telecommunications; Viscount Waverley, chairman, Port of London Authority; and Dr Lee Du Bridge, president, California Institute of Technology

BANQUET SPEAKERS include Don C. Mitchell, chairman, Sylvania Electric Products, Inc; A. C. Monteith, president of AIEE and vice president, Westinghouse Electric Corp with Walker Cisler, president, Detroit Edison Co, toastmaster of Jubilee banquet

IEC PRESIDENT Dr Harold S. Osborne, left center, greets Dr Hilding Tornebohm, president International Standardization Organization (ISO). At extreme left is Louis Ruppert, secretary of IEC. At extreme right is Henry St Leger, secretary general of the ISO

Acceleration of international standardization, as a catalyst to world trade, was urged strongly before the International Electrotechnical Commission (IEC) in Philadelphia recently by spokesmen of both the British and French delegations.

Speaking before some 800 scientists and electrical engineers from 21 countries during the day-long celebration of IEC's Golden Jubilee, Sept. 9, Viscount Waverley, chief of a British delegation of 96 and chairman of the Port of London Authority, pointed out there may be some temptation to use national standards as a protective device in the interests of the home producer.

"This would be a gross mis-use of standards and of the knowledge and effort that go to their establishment," he said. "Clearly the demand in world markets for sound well-designed electrical installations will be accelerated if, through greater standardization, the material and apparatus can have a more general application and can be produced and then maintained at a lower cost."

KEY CONTRIBUTION

"The main contribution of international standardization, to the lowering of trade barriers, is through standardization of basic techniques so that the essential qualities or performance of products and equipment can be correctly appraised," Lord Waverley said.

"There is an opportunity today," he said, "to avoid an unnecessary variety in the insulation levels of equipment for extra high voltage transmission, by laying down standards for such equipment designed for a limited number of voltage levels. Such work can eliminate difficulties that have hampered international trade in the past."

As Sir John Anderson, Lord Waverley was Home Secretary and Minister of Home Security and Chancellor of the Exchequer in the Churchill Cabinet from 1943 to 1945.

Pierre J. Ailleret, chief of the French delegation of 46 and director of research of Electricite de France, pointed out that the sheer speed of electrical

World Standardization, IEC Delegates Urge

development and the necessity of keeping up with rapid progress through international contacts has forced the accelerated evolution of electrical standardization.

"Interconnection between neighboring countries, leading to interchangeability of equipment must be more facilitated," Ailleret continued. "Also the possibility of importing equipment from a distant country or being able to export some there, is increased as much by standardization as by reducing distance."

Ailleret pointed out that internation standardization would be facilitated if principles of standardization were taught in technical schools. The publication of booklets on standardization does not answer the need of young engineers endowed with critical minds. "An honest teaching of standardization would aim much higher and could actually have a true formative value to engineers," he said.

As a result of the projected installation of a transatlantic telephone cable linking Europe and America, plans are already being made for a complete global communication network that will permit intercontinental television and instantaneous telephone conversation with any part of the globe.

This disclosure was made by Dr Hakan August Sterky, director general of Sweden Telecommunications, in a Jubilee Day address on the future of the standardization of telecommunication.

STUDIES UNDERWAY

Dr Sterky said that studies are underway on how European telephone network can be linked with networks of Southern and Eastern Mediterranean states. Last year plans were extended to embrace the Middle East and South Asia. Analysis of present traffic volume and an estimate of circuits needed have been made and a tentative map drawn showing arteries of the complete system has also been finished.

No decisions have been made, however, Dr Sterky said, as to the technical means which should be used in the project. It is likely that in addition to carrier systems, submarine coaxial cable systems and radio links will be useful, he said.

The opportunities for standardization in the field of atomic energy today far exceed any of the other fields of engineering, both from the standpoint of military and civilian applications, Don C. Mitchell, chairman of Sylvania Electric Products, Inc, told the IEC.

CITES ATOM'S IMPACT

Speaking at the banquet of the Jubilee Celebration, Mitchell said the final impact of nonmilitary applications of atomic energy in changing the course of world affairs will be even greater than the atomic bomb. Declining economic areas with dwindling fuel resources will receive new blood. Remote areas like the Arctic will take on new significance, opening up vast new resources to the world.

"Just how rapidly atomic energy is put to work to serve man, rather than to destroy him, will depend upon the degree with which technical information flows throughout the world," Mitchell said.

Gen Walter Bedell Smith, Undersecretary of State, in greeting the IEC representatives served notice that the time may come when the United States will have to unleash atomic weapons to preserve American liberty.

"These weapons will be called into play only to put down aggression," he said. "But everyone should realize that a point could be reached where their use might be necessary to preserve the liberty which thousands of Americans deemed to be worth more than life.

"The United States," General Smith said, "has an aim so simple that there are some even among our friends who hesitate to give it full faith and credence. It is to prevent war."

General Smith's speech was read for him by Undersecretary of State for Administration, Charles E. Saltzman.

A clear warning, that basic research in science has not expanded in this country since the war but has remained static or declined was issued by Dr Lee Du Bridge, president of California Institute of Technology. Congress, he said, has been niggardly in its appropriations to research agencies to the point that today it is the responsibility of industry and individuals to support research in basic science.

In spite of widespread public belief that any desired technological product —from pocket radar to cures for cancer—can be purchased at will if sufficient millions are spent, the fact is that knowledge grows slowly . . . all technology and all pure and applied science constitute a single great coherent structure of knowledge and understanding. Technology cannot rest on thin air, it must be supported by basic research in pure science, he said.

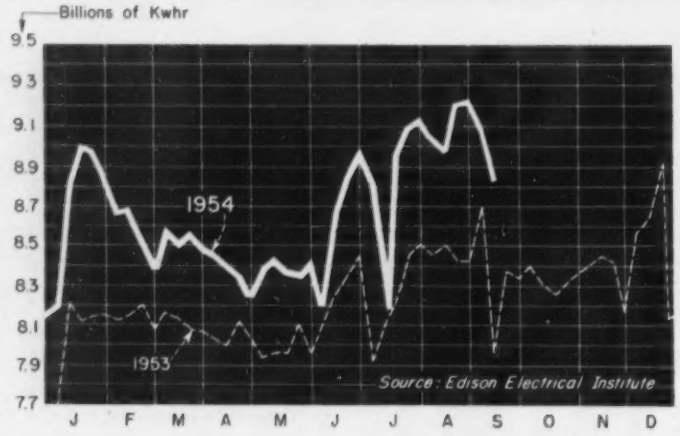
A. C. Monteith, vice president of Westinghouse Electric Corp and president of the American Institute of Electrical Engineers, pledged the continued support of AIEE to the work of the IEC. He cited the mutual bond of purpose and understanding between AIEE and the IEC dating from the formation of IEC at the International Electrical Congress at St. Louis in 1904 when members of AIEE were prominent in launching the venture.

The IEC is an international organization made up of national standards bodies of 30 countries. Its committees recently held two weeks of meetings on the campus of the University of Pennsylvania (Sept. 1-16) in an effort to develop world-wide standards in electric power, light and communication.

U. S. COMMITTEE

Dr Harold S. Osborne, formerly chief engineer, American Telephone & Telegraph Co and IEC president, presided at Jubilee Meetings. Richard C. Sogge, General Electric Co, president of the U. S. National Committee, presided at the banquet. P. H. Chase, Philadelphia Electric Co, was chairman of the general committee in charge of arrangements. The meetings were financed by funds contributed by American industry. Chairman of the finance committee formed for raising funds was Walter Cisler, president of Detroit Edison Co, who also was banquet toastmaster.

STATISTICS



Output Week Ended Sept. 11—8,808,000,000 Kwhr

Per Cent Change from Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Sept. 11	+10.6	+0.2	+7.0	+2.8	+8.4	+22.0	+30.0	−0.8	+3.6	+1.0
Sept. 4	+4.5	−13.7	−5.4	−3.7	+4.4	+16.1	+24.1	−2.0	+2.9	+4.7
Aug. 28	+8.0	−0.4	0.0	+1.0	+7.3	+20.3	+22.2	−0.3	+2.2	+3.5

Seasonally Adjusted Index† 173.7* Week Ago 173.0 Year Ago 162.3

Electric Power Statistics

		Latest Month	Preceding Month	Year Ago
Peak Load‡ (Million Kw)	June	78.0	74.0**	73.0
Capacity (Million Kw)	July	96.98	95.31	86.11
Production (Billion Kwhr)	July	40.08	38.90	38.03
Hydro	July	8.76	9.59	8.75
Fuel	July	31.32	29.31	29.28
Fuel Consumption				
Coal (Million Tons)	July	9.40	9.29	9.59
Oil (Million Barrels)	July	4.45	4.29	6.34
Gas (Billion Cu Ft)	July	113.20	107.79	109.35
Sales (Billion Kwhr)	June	32.57	31.59	31.77
Residential	June	9.32	9.31	8.37
Commercial	June	6.04	5.62	5.46
Industrial	June	14.85	14.43	15.80
Other	June	2.36	2.23	2.14
Net Income Class A & B Companies ($ Million)	June	86.76	85.46	77.52
Estimated Dec. '54 Peak ‡(Million Kw)	June	88.1	88.1	91.9
Kwhr per Residential Customer (12 Month Average)	June	2,441	2,427	2,256
Revenue per Kwhr Residential Service (12 Month Average)	June	2.71¢	2.72¢	2.76¢
Canadian Production (Billion Kwhr)	June	5.67	5.93	5.26

Business Statistics

FRB Industrial Production Index†	July	117*	124	129
Gross National Product Annual Rate ($ Billion)	2nd Qtr.	356.0	355.8	369.9
EW 4 Industry Production Index†	May	114.9	114.6	126.2
ENR Construction Cost Index††	July	135.0	130.5	126.6
BLS Consumer's Price Index	June	115.2	115.1	114.7
NEMA Insulation Materials Sales Index†	July	92	124	150
NEMA Electric Appliance Sales Index†	July	88	102	86
NEMA Household Refrig. Sales Index†	July	93	82	87
Metal Prices (Sept. 14)				
Copper, Conn., V., lb		$.30	$.30	$.29¾
Lead, N. Y., lb		.14½	.14	.14
Zinc, prime Western E. St. Louis, lb		.11½	.11	.10
Tin, Straits, qual. N. Y. lb		.93¾	.93½	.81
Aluminum, ingot, base price		.21¼	.21½	.21½
Nickel, base price		.60	.60	.60
Steel, billets, Pitts., ton		64.00	64.00	62.00
Steel, scrap, No. 1 heavy, Pitts., ton		30.00	29.00	41.00

*Preliminary **Revised ‡Class 1 Systems †1947-49=100 ††1949=100

Second Quarter Outlook Hopeful with GNP Steady

When gross national product assumed the same level at the end of the second quarter this year as it had at the first—a rate of $356 billion, there was a considerable spur to more optimistic feelings in the realm of business activity. After declines in the preceding three periods, the stabilizing rate suggested that perhaps it would grow no worse than this, which was 4% below the second quarter peak of 1953, though 4% above the comparable period of 1952.

To offset the continued major reductions in Federal spending and business inventories, consumer private expenditures and new private construction advanced during the second quarter to add $3½ billion to the sum of final expenditures. Business inventories were being cut at about the same rates as the preceding two quarters, but Federal spending took a further sizable drop so that the spurt in private expenditures had to be a significantly strong counterbalancing element.

	Second Quarter 1952	1953	1954
	(billion $)		
Gross National Product	341.4	369.9	356.0
Change in business inventories	−.9	5.4	−3.8
Final purchases	342.3	364.5	359.8
Federal purchases	55.1	62.2	51.3
All other	287.2	302.3	308.5
Personal income	267.8	286.4	285.7
Personal taxes	34.0	35.9	32.9
Disposable personal income	233.8	250.4	252.9

Comparing the 1954 second quarter with last year's, the major reductions in Federal spending (mostly for national security purposes) amounted to $11 billion—from $62 billion last year down to $51 billion. The swing in business inventories was of like magnitude from a net accumulation of over $5 billion last year to net liquidation of $4 billion currently. Almost all of this inventory reduction occurred in durable goods, while about two-thirds of the reduction in Federal spending occurred here.

Other major expenditures held firm or showed increases over the period so that these helped to make the total decline over the year less severe. Actually, they served to offset about 2/5 of the combined decline mentioned.

Duquesne Rate Case Reversed

The Pennsylvania Superior Court recently reversed the Dec. 22, 1953 order of the Pennsylvania Public Utilities Commission in the Duquesne Light Co rate case.

The court's reversal sustained the company's appeal on two points: (1) wage and tax expenses and (2) annual depreciation expense. On all other points the commission's order was sustained.

With regard to the first point, the court held that the commission was wrong in eliminating excess profits tax expense, the tax having been repealed after the end of the base year 1952, without making a corresponding adjustment for a wage increase also occurring after the end of the base year. The court said:

"The commission should either make a corresponding adjustment for the wage increase, or adhere more strictly to the base year concept by not making either adjustment."

On the second point, the court held that the commission was wrong in refusing to make an allowance in annual depreciation expense sufficient to recover, over the remaining life of the property, the "deficiency" in the company's depreciation reserve. The court said:

"In the present case, however, there is nothing to show that the company was guilty of any faulty past practices in accumulating its book reserve, or that the conceded deficiency therein is not genuine."

The conclusion and order of the court are as follows:

"To summarize, we find no errors in the commission's order except with regard to (1) the making of an adjustment for the elimination of the excess profits tax without a corresponding adjustment for the wage increase; and (2) the allowance for annual depreciation expense. In the latter connection we are not to be understood as indicating that the remainder investment approach should always be followed. In the case at bar, however, we cannot now approve a complete change in policy to the company's prejudice.

"The order of the commission is reversed, and the record is remanded to the commission with instructions to proceed in a manner consistent with the views expressed in this opinion."

Pacific P&L to Sell Property

Pacific Power & Light Co has agreed to sell a portion of its distribution system to Eugene Water & Electric Board, Ore., for $1,220,060. This action was a compromise settlement of a condemnation suit filed by the Eugene board against Mountain States Power Co, which has merged with PP&L.

Area affected by the sale is across the Willamette River from Eugene and includes parts of Oakway and Willakenzie Districts. About 70 miles of distribution lines will change hands as well as 2,141 customers. "The properties involved are in areas adjoining the city of Eugene, which may logically be expected to become a part of the city," said Paul B. McKee, president of PP&L.

The agreement includes only part of the territory involved in the condemnation suit that the board filed (EW, May 10, p 15). Other part of the territory will continue to be served by PP&L and will not be invaded for ten years. Condemnation proceedings have been dropped. Eugene will take possession after full payment is made.

A Business-Like Solution . . . McKee expressed the view that he and his associates in the merged Mountain States organization believe the settlement a business-like solution to a potentially wasteful service duplication problem.

McKee stated:

"The price we are to receive for the properties is the best that could be expected under the circumstances, and we intend to invest the $1,220,060 in the development of other facilities elsewhere in our Oregon service area.

"The territorial agreement between the city and the company settles for a long time any question of further duplication problems and is, in my opinion, a wise and constructive step.

"Furthermore, agreement that the company is to retain the substantial territory immediately to the north and east of the City of Springfield, which was included in the original condemnation action, will preserve for us the opportunity to help Springfield citizens develop the residential and industrial potential of that part of the rapidly growing community."

Lionel Trommlitz, president of the Eugene board, said of the agreement:

"This solution insures the City of Eugene an economical and efficient operating area. It will permit us to go ahead at an accelerated pace with residential and industrial development of our natural service area. The Pacific management is to be commended for its willingness to deal realistically with the situation and to avoid the delay and heavy expense for both of us that would have been involved in trial of the condemnation action."

Wellington Fund Buys $5-Million Common Stock

Over $5 million of electric utility commons were purchased by the Wellington Fund during the first half of 1954. According to the mutual fund's semi-annual report, on June 30 the Wellington's electric utility commons totaled $27,897,437, represented 8.32% of its total net assets, and constituted one of its largest single equity investments in any industry.

The following utilities' commons were purchased by the fund during the six-month period:

Company	Shares
Central Illinois Public Service	2,500
Connecticut Light & Power	20 000
Consolidated Edison	8 000
Consumers Power	10,000
General Public Utilities	6,000
Ohio Edison	17,000
Pacific Gas & Electric	15,000
Philadelphia Electric	50,000
Rochester Gas & Electric	4,600
Shawinigan Water & Power	500
Southern California Edison	50,000
Texas Utilities	10,000
Union Electric of Missouri	25,000

Largest single electric utility invest-

ment was 70,000 shares of Consolidated Edison Co of New York, Inc. Other large holdings included: 60,000 shares of General Public Utilities Corp and Central Illinois Public Service Co; and 50,000 shares of Consumers Power Co, Philadelphia Electric Co, and Southern California Edison Co.

Chicago Utilities Plan To Sell Stock to Employees

Commonwealth Edison Co has filed with Securities & Exchange Commission a registration statement covering 500,000 shares of its common stock to be offered to employees over a period of years under an "employee stock purchase plan." The company also filed an application with the Illinois Commerce Commission.

Northern Illinois Gas Co, an Edison subsidiary, also made filings with the SEC and the ICC covering 200,000 shares of its common stock to be offered under an "employee stock purchase plan."

Edison's chairman, Willis Gale said that under the plan all legal employees, regardless of job or pay, would be eligible to purchase stock through payroll savings. Employees may authorize payroll deductions up to a maximum of 10% of base pay to be applied toward the purchase of stock. The accumulated savings would be used twice each year, on April 15 and October 15, to buy stock at 90% of the closing market price on those dates.

Coast Counties G&E Merges into Pacific G&E

Merger of Coast Counties Gas & Electric Co into Pacific Gas & Electric Co was completed recently when PG&E filed a certificate of ownership with the California Secretary of State.

In acquiring sole ownership of Pacific Public Service Co and its subsidiaries, of which Coast Counties is the principal, PG&E added 139,283 gas, electric, and water customers. Continuity of service was not affected by the switch-over.

Norman R. Sutherland, vice president and general manager of PG&E, reiterated earlier statements that the 611 Coast Counties employees are

(*Continued on page* 238)

Today in Utility Finance

YIELDS (%)

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
Sept. 9	**2.88**	**2.92**	**3.12**	**3.92**	**4.06**	**4.41**	**4.68**	**4.83**	**5.17**
Sept. 2	2.87	2.91	3.11	3.93	4.07	4.40	4.51	4.87	5.15
END OF QTR.									
2nd 1954	2.90	2.96	3.19	4.03	4.14	4.48	4.72	5.04	5.45
1st 1954	2.82	2.87	3.14	3.88	4.09	4.42	4.83	5.19	5.42
4th 1953	3.07	3.12	3.34	4.17	4.32	4.62	5.07	5.57	5.51
3rd 1953	3.30	3.33	3.54	4.35	4.52	4.83	5.36	5.57	6.01

Data: Reis & Chandler, Inc.

EARNINGS

Company	Period Months	Ended	Net Income 1954	Net Income 1953	Earnings Per Common Share 1954	Earnings Per Common Share 1953
Arizona Public Service	12	July	$4,421,000	$3,527,000	$1.45(a)	$1.23(a)
California Electric Power	12	June	2,702,278	2,632,066	.86	.82
California-Pacific Utilities	12	July	621,129	543,617	2.12(b)	1.99(b)
Consumers Power	12	July	26,050,523	22,418,160	3.04(c)	2.80(c)
Dallas Power & Light	12	July	5,247,369	4,851,052	....	....
Delaware Power & Light and subsidiaries	12	July	4,543,958	3,996,001	2.02	1.97
Kansas City Power & Light	12	July	6,617,715	6,308,623	2.17(f)	2.32(f)
Louisiana Power & Light (corrected)	12	July	3,752,338	3,463,636	....	....
Public Service Co of Indiana	12	July	12,074,673	11,111,170	2.34(g)	2.26(g)
Southern Co and subsidiaries	12	July	22,447,080	21,369,550	1.24(h)	1.18(h)
Texas Electric Service	12	July	9,756,155	8,755,109	....	....
Texas Power & Light	12	July	9,670,126	8,651,262	....	....
Virginia Electric & Power	12	July	14,772,472	12,367,403	2.08(i)	1.86(i)

Notes—(a) After deferred federal income taxes and based on shares outstanding at end of period; (b) Based on 231,659 shares in 1954 and 228,032 shares in 1953; (c) Based on 7,473,798 shares in 1954 and 6,794,362 shares in 1953; (f) Based on 2,450,000 shares in 1954 and 2,224,540 shares in 1953; (g) Based on 4,251,060 shares in 1954 and 4,253,069 shares in 1953; (h) Based on 18,087,643 shares in 1954 and 1953; and (i) Based on 5,999,980 shares in 1954 and 5,441,034 shares in 1953.

FINANCING

Company and Description	Amount of Offering ($000)	Offering Price	Yield to Public
WEEK OF SEPTEMBER 9–15			
Preferred Stock			
Oklahoma Gas & Electric—75,000 sh 4.24% $100 par	$7,500	$101.875	4.162%
Illinois Power—180,000 sh 4.20% $50 par	9,000	50.90	4.1257
Georgia Power—433,869 sh (being offered in exchange for outstanding $6 pfd on a share-for-share basis, plus $5 in cash and accrued dividends; offer will expire Oct. 4; unexchanged $6 pfd will be called at $110)	.....	.....	.....
SCHEDULED FOR SEPTEMBER—OCTOBER			
Bonds and Debentures			**Bid Date**
Dayton Power & Light—1st mtg due 1984	$15,000	.....	Sept. 22
Northern States Power (Minn.)—1st mtg due 1984	20,000	.....	Sept. 28
Vineland, N. J.—electric plant due 1955–74	3,500	.....	Sept. 28
Western Massachusetts Electric—1st mtg due 1984	6,000	.....	Sept. 28
Columbus & Southern Ohio Electric—1st mtg due 1984	10,000	.....	Sept. 29
Public Service Co of Colorado—1st mtg due 1984	20,000	.....	Oct. 4
Indiana & Michigan Electric—1st mtg due 1984	16,500	.....	Oct. 5
Metropolitan Edison—1st mtg due 1984	15,000	.....	Oct. 5
Wisconsin Power & Light—1st mtg due 1984	18,000	.....	Oct. 6
Sierra Pacific Power—1st mtg due 1984	4,000	.....	Oct. 8
Texas Power & Light—1st mtg due 1984	20,000	.....	Oct. 18
Louisiana Power & Light—1st mtg due 1984	18,000	.....	Oct. 20
Savannah Electric & Power—1st mtg	5,000	.....	Oct. 26
Savannah Electric & Power—debs	3,000	.....	Oct. 26
Central Louisiana Electric—conv debs due 1964 (to be offered to stockholders)	3,775	.....	.....
Preferred Stock			
Tampa Electric—50,000 sh $100 par	$5,000	.....	Sept. 22
Indiana & Michigan Electric—40,000 sh $100 par	4,000	.....	Oct. 5
Savannah Electric & Power—30,000 sh $100 par	3,000	.....	Oct. 26
Mississippi Power & Light—44,476 sh $100 par (to be offered in exchange for outstanding $6 pfd on a sh-for-sh basis, plus a cash difference between initial public offering price of new shares and redemption of the old shares; offer will expire Oct. 28)	.....	.....	.....
Common Stock			
Illinois Power—200,000 sh	.....	.....	Sept. 16
Columbus & Southern Ohio Electric—200,000 sh	.....	.....	Sept. 21 (a)
New England Electric System—918,883 sh $1 par (to be offered commonholders on a 1-for-10 basis, record Sept. 29)	.....	.....	Sept. 28
San Diego Gas & Electric—800,000 sh (being offered commonholders on 1-for-4 basis, record Sept. 14 to expire Oct. 5; unsubscribed first to officers and employees)	$11,000	$13.75	5.09%
Sierra Pacific Power—34,807 sh (to be offered commonholders on a 1-for-10 basis and preferred holders on a 1-for-5 basis, record Oct. 5 to expire Oct. 22)	.....	.....	.....
Middle South Utilities—475,000 sh (to be offered commonholders on a 1-for-15 basis, record Sept. 22 to expire Oct. 8)	.....	.....	.....

Note—(a) Dillon Read & Co. Inc, group, underwriters.

Florida P&L Gets 'Free Ride'

Manufacturers supplying equipment to the utility give it a boost in advertisements run in nationally circulated magazines

Florida Power & Light Co and Florida are getting a "free ride" in advertisements circulated throughout the nation by manufacturers of equipment it buys. The "free ride" deal was thought up and promoted by Malcolm B. McDonald, vice president in charge of advertising and public relations.

Each advertisement promotes three ideas: 1. the manufacturer's products, 2. the great job Florida P&L is doing or its progressiveness, 3. the rapid expansion of or the great industrial progress being made in Florida. Item 3 was suggested by McDonald because he believes that anything that helps Florida helps his company even though it serves but part of the state.

Manufacturers have given the Florida ads a cordial reception. The first ones were suggested by the utility. Now other manufacturers are approaching Florida P&L and asking to be included.

Here is how the plan works:

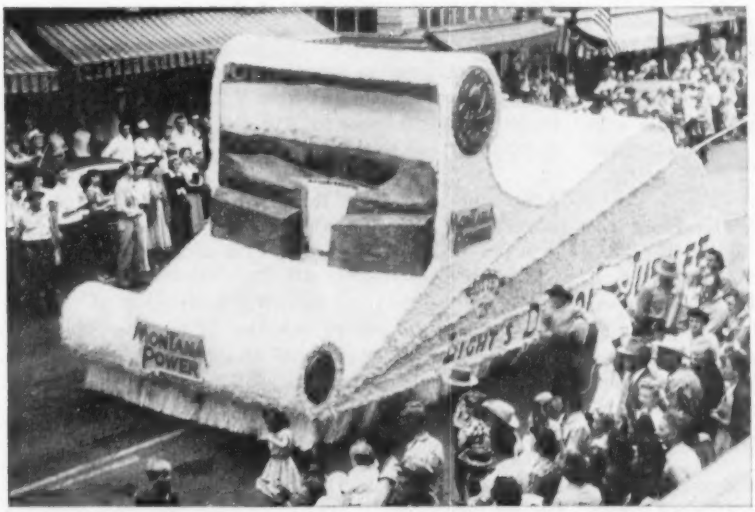
The utility's advertising department takes pictures of a manufacturer's equipment being used on the utility's system. Copy and layout are prepared. Then they are sent to the manufacturer with the suggestion that the Florida theme will attract attention because of the appeal the state has throughout the country.

The first company approached was Aluminum Co of America. Since then a dozen others have used the Florida theme. Some idea of the ads may be gained from their headlines:

"Power plants, like everything else, expand fast in Florida."—American Blower Corp. "Control Corporation helps Florida grow." "Power lines are busy in Florida."—Copperweld Steel Co. "Great climate for business, too!"—Ebasco Services, Inc. "G-E 2-way radio helps FP&L keep pace with fast growing Florida." "6 Pitman hydralifts now in use by Florida Power and Light."—Pitman Manufacturing Co. "Even under the Florida sun, aluminum paint lasts longer."—Aluminum Co of America. "More power to Florida . . . rope helps get it there!"—Plymouth Cordage Co. "Miami . . . city of magic growth . . . and Rome helps her power grow!" Rome Cable Corp. "Clear the track for sunshine service."—Wagner Electric Corp.

Not all of the ads followed the layout and copy prepared by the utility. The company can edit the layout or scrap it altogether. But Florida P&L doesn't care. It stands willing to cooperate in any way with the manufacturers. After all promoting FP&L and Florida are more important than any pride in copy and layouts.

In addition to Electrical World, the ads have appeared in magazines, such as "Saturday Evening Post," "Time," "Business Week," "Newsweek," and newspapers, such as the "New York Times," "Wall Street Journal," and "Journal of Commerce."



Montana Power Takes 'Kerr Dam' on Tour

Montana Power Co is commemorating Light's Diamond Jubilee throughout the state with a float and a working model of one of its 12 dams. Jubilee medallions and large trademarks of the company are featured prominently on the giant blue-and-white float. The vehicle made its debut this summer at the 75th anniversary of Butte, a natural tie-in with the 75th anniversary of light. It also will be shown in several cities this fall.

Mounted on the rear of the float is a working model of the company's 120,000-kw Kerr project. The dam is in the center of a diorama over which reads, "Power for a Growing Montana."

In towns where a stationary display is desired, the dam is placed in a booth. The model is 10 ft wide, 6 2/3 ft high, and 4 ft deep. A 50-gpm pump keeps the water flowing. Baffle plates in the reservoir portion of the dam soften the surge, permitting the water to flow evenly through 14 headgates to simulate actual operation at the dam.

Gives Jubilee Gift

Duquesne Light Co has mailed to each of its residential customers an A-23, 150-w light bulb. The mailing was made in a special Light's Diamond Jubilee carton, and a Jubilee booklet was enclosed.

(*More Public Relations on Page* 257)

WASHINGTON COMMENT

JESSE MOCK

Partisans of public power were not content with a single preference clause in the new Atomic Energy Act. They wrote two into it. This was a part of the compromise made to head off a further filibuster as Congress ended its session in August. Some well-informed public power backers say candidly these clauses will give no practical advantage to public power groups.

Two Preference Clauses in New Atomic Law

It is no secret that both these preference provisions were, in part, face-saving devices for the public power senators who fought unsuccessfully to write a legal ban on the Dixon-Yates power sales proposal.

The first preference, discussed in a previous column (EW, Sept. 6, p 72), relates to the sale of surplus power from Atomic Energy Commission experimental and production facilities. The second involves the issuance of licenses for commercial power plants.

Section 183c of the act recently signed by President Eisenhower reads:

"The Commission (AEC), in issuing any license for a utilization or production facility for the generation of commercial power . . . shall give preferred consideration to applications for such facilities which will be located in high cost power areas in the United States if there are conflicting applications for a limited opportunity for such license. Where such conflicting applications resulting from limited opportunity for such licenses include those submitted by public or cooperative bodies such applications shall be given preferred consideration."

A Test Atomic Plant Must Be Sufficiently Developed . . . Here again Congress attempts to slice a pie that does not exist. To qualify as a commercial plant, an experimental facility must be found by AEC to be "sufficiently developed to be of practical value for industrial or commercial purposes . . ." This would presumably include at least some determination of economic feasibility. With the ground only freshly broken for the first utility-size experimental plant, there is simply no known facility that could meet this preliminary qualification.

Looking further ahead, several of the drafters of the new atom law contend that this second preference clause will never give rise to the bitter public-private power controversies engendered by the preference marketing clauses in flood control and reclamation legislation. They argue these points:

- There is a similar clause in the Federal Power Act giving preference in the issuance of hydroelectric project licenses to states and municipalities, and this has rarely been a bone of contention.
- About the only situation in which there could be a "limited opportunity" for licensing a commercial atomic power plant would occur if there were a limited supply of atomic fuel. It is difficult to conceive of that situation for some years to come.
- In theory, at least, AEC would award licenses to any qualified firm or group which proposes to build an approved type of plant. There would be no limit on the number of plants for any single area. Scraps over franchises would have been settled at state or local levels before a federal license for operation of a commercial plant would be granted. The preference clause in the new act would give no advantage to public groups in obtaining a franchise or other preliminary authorizations.

On the other hand, it is possible to visualize a situation in which this clause might play a decisive role. This would be more probably under an administration crusading for public power.

Suppose the time should come when both a privately owned utility and a public group propose to build a large scale power plant to serve the expanding needs of the same area. Suppose there were no state or local restraints to prevent this expensive duplication of effort.

Although the language of the law does not specifically give public bodies sole priority in obtaining a license for such a plant, the law might be interpreted to favor the public group in such a situation.

Few people expect to get any administrative or court test of this clause for years to come. But whatever its real significance, it looks like the clause is in the law to stay.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Number of possible interference conditions that result from intermodulation rises from 9 for 3 working channels to 50 for 5 channels, to 450 for 10 channels, and to 495,000 for 100 working channels.

Attenuation magnitude for a wave is dependent on the wave shape, one with a long tail being attenuated less than one with a short tail. A wave chopped near crest is attenuated greatly.

Organic acids formed by oxidation of oil are doubly bad because they are conductive and because they aid in retention of water. Their degradation produces sludge and metallic soaps.

Fixed charges on original investment remain pretty much the same over the life of utility facilities, but the labor cost for operation and maintenance is consistently upward.

Heaving and cracking of transformer pads due to frost action are likely occurrences if the underlying earth is fine sand or poorly drained silt. Enlarged bases resist uplift.

Furnace casing of a pressurized boiler need not be leak-tight if the barrier is established at the water-walls by welding a bar spacer between adjacent tubes.

Ashes high in iron oxide, calcium oxide, and other basic compounds are readily fusible. Those high in aluminum oxide and silica are relatively resistant to fusing in the boiler furnace.

Unbalance of untransposed transmission lines is decreased when ground wires are added.

electrical industry forecast for 1954-1970

In 1955 the electric energy sales increase will expand 8% compared with a 6% gain estimated for 1954. Growth in 1954 will be the lowest since 1949, but plant and equipment additions are holding up to the record set in 1953. And 1955 may show little decline in expansion of facilities.

Business in 1955 is predicted to be on the upgrade with Gross National Product near the 1953 record and disposable income at a record high of $257 billion.

By 1970 sales of electric energy may be expected to total nearly 1.2 trillion kwhr—peak loads 250 million kw.

Electrical World's predictions are based on the fact that Americans will continue to strive for, and achieve, an improved standard of living—a standard which is becoming synonomous with electrical living. To meet the demands of constantly rising population and living standards, industry, agriculture, and commerce must continue to grow.

The dynamic post World War II growth of the American economy has brought with it a spectacular rise in the use of electrical equipment and resulting energy consumption. The economy's predicted continued growth will bring with it a continued rapid rise in the use of electric energy.

We believe this to be true for a number of reasons:

1. To meet the demands for an improved standard of living, industry must increase its production of goods.

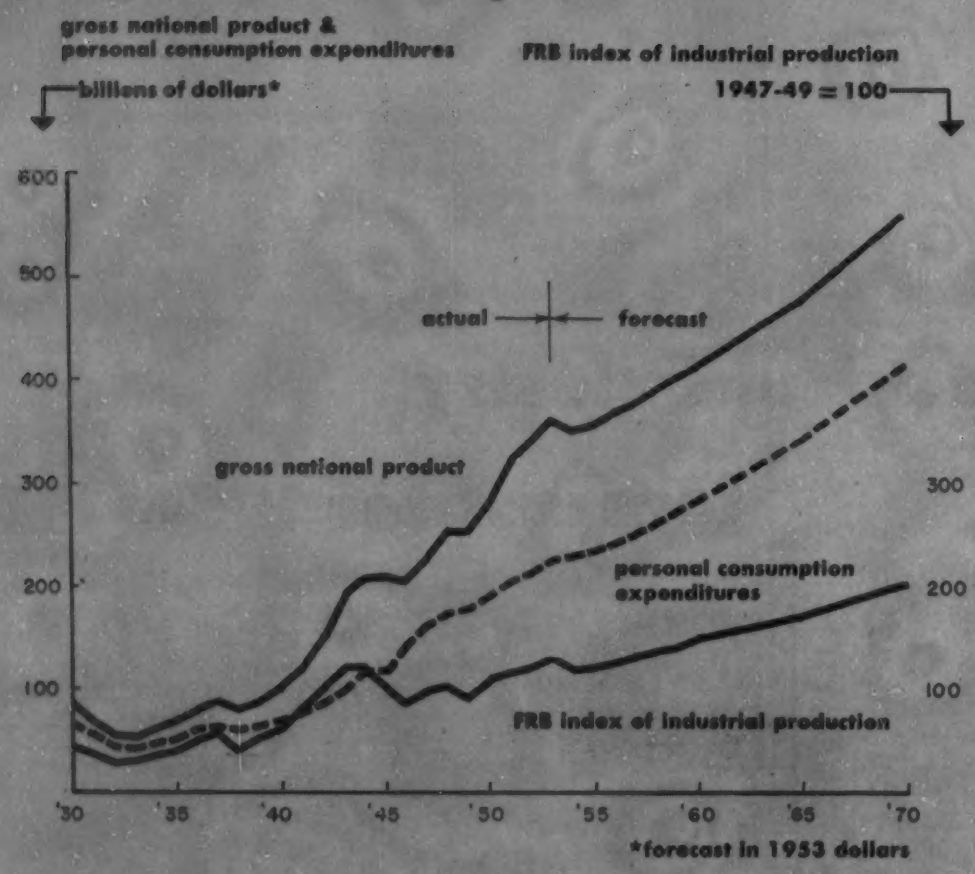
2. The trend toward greater leisure time among the nation's workers will restrict the rise in the number of man-hours available to business.

3. With only a relatively small rise in manpower, industry must sharply increase its use of machinery in order to serve the increased production.

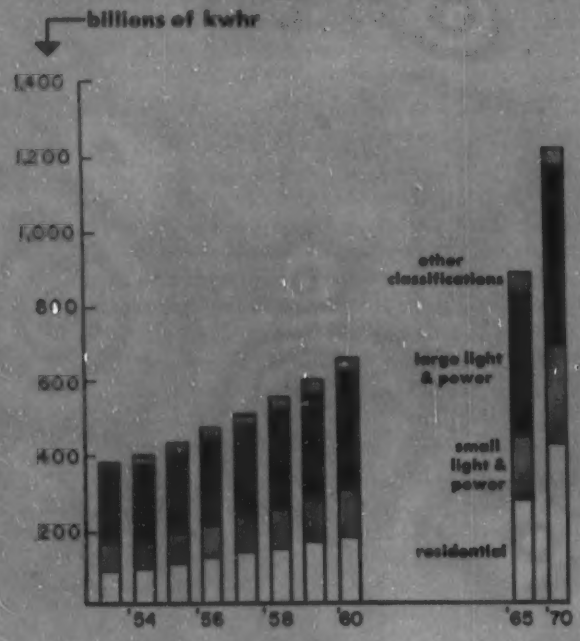
4. The consumer's share of the greater Gross National Product will increase. And with his increased share the consumer will purchase the electrical conveniences and comforts which have been luxuries in the past.

8% increase in electrical energy sales predicted is same rate as average for last decade

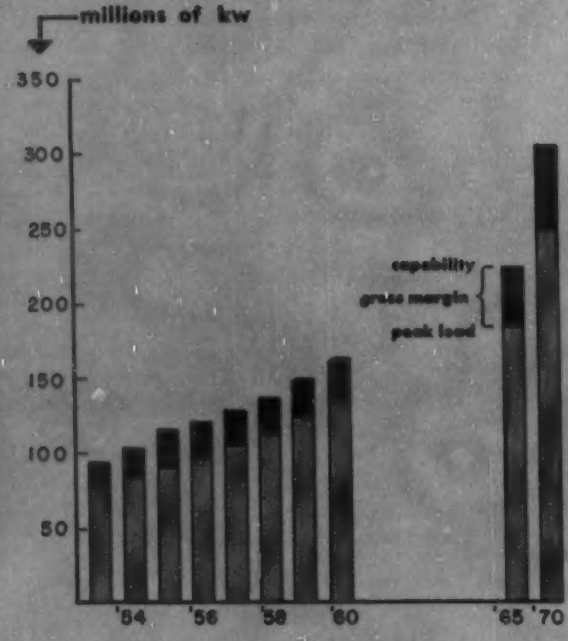
production and consumption



energy sales – total electric utility industry



peak, capability & margin class I electric systems



the economy

We believe that the United States economy will grow by 58% or more in the next 16 years. This forecast assumes that there will be no serious depressions or major war during that period.

Growth is likely to be slower in the next few years than later in the period. One reason is the continuing decline in military spending which cuts activity in basic industries like automobiles and steel. Another is that the economy has just had a wave of super-expansion, needs time to absorb it before another big growth period.

Gross National Product—$355 billion this year—is expected to be about $360 billion in 1955 and $370 billion in 1956. After that, growth should be more rapid, with GNP up past $415 billion by 1960. Industrial production will also be only slightly higher next year—perhaps 125 on the FRB index, against 123 in 1954.

A new big wave of expansion is expected in the 1960's. It will be sparked by a boom in consumer spending as the babies born after the war grow up, get married, have children, and start to stock up with cars, houses, appliances.

the economic boom coming in the early 1960's will carry the electric industry to new heights

the industry

Sales to all classes of customers will show an increase during 1954 despite the current economic recession. Increased sales to large light and power customers, affected most by the economic downturn, do not clearly reflect the 8% decrease in industrial production experienced during 1954. This is due to the fact that sales to Atomic Energy Commission installations will add some 14 billion kwhr.

Anticipated strong gains in the sales to residential and small light and power will help boost 1955 sales an estimated 8%. Important in this rise, will be the predicted 7% increase in sales to large light and power brought on by a 2% increase in industrial production and an increased demand by the AEC program.

Peak loads are expected to rise 8.5% during 1954 to 85.2 million kw for Class I systems. A predicted improvement in load factor during 1955 will result from the anticipated higher level of industrial production and increased use by AEC installations.

Total sales of energy may be expected to increase some 199% during the next 16 years. If the economy grows at the predicted rate, sales should reach nearly 1.2 trillion kwhr in 1970. In that year the industry should experience a 249 million kw peak.

Wonder if the industry will sell enough for energy sales to reach 1.2 trillion by 1970?

industry-wide sales of electric energy—billions of kwhr

	residential		small light & power		large light & power		other classifications		total
	sales	% total	sales	% total	sales	% total	sales	% total	sales
1948.....	51.0	21.2	43.2	17.9	124.1	51.6	22.5	9.3	240.7
1949.....	58.1	23.4	46.3	18.6	120.8	48.6	23.4	9.4	248.5
1950.....	67.0	23.9	50.4	18.0	139.1	49.5	24.0	8.6	280.5
1951.....	77.0	24.2	57.3	18.0	157.8	49.6	26.0	8.2	318.2
1952.....	86.8	25.3	62.1	18.1	167.4	48.9	26.2	7.7	342.5
1953.....	97.9	25.2	69.3	18.0	190.0	49.5	28.0	7.3	384.2
forecast									
1954.....	107.8	26.6	74.3	18.3	194.7	48.0	28.8	7.1	405.6
1955.....	119.3	27.3	81.0	18.5	207.5	47.4	29.9	6.8	437.6
1956.....	131.4	27.4	87.1	18.2	229.8	47.9	31.0	6.5	479.2
1957.....	144.4	27.9	94.1	18.2	246.0	47.6	32.1	6.2	516.5
1958.....	158.3	28.3	102.7	18.4	265.7	47.5	33.1	5.9	559.8
1959.....	173.3	28.6	112.1	18.5	286.6	47.3	34.3	5.6	606.3
1960.....	190.2	28.8	122.3	18.5	311.9	47.3	35.2	5.3	659.7
1965.....	289.4	32.2	174.7	19.5	393.1	43.8	40.5	4.5	897.6
1970.....	438.8	36.2	232.9	19.2	496.1	40.9	45.9	3.8	1,213.5

residential sales continue to gain at expense of industrial

output, peak load & generating capability class I systems

	output	winter non-coincident peak load	load factor	capability	gross margin
	billions of kwhr	millions of kw	%	millions of kw	% peak
1948.....	277.0	51.1	61.9	54.4	6.6
1949.....	287.7	54.0	60.8	61.7	14.2
1950.....	328.6	61.6	60.5	68.4	10.3
1951.....	370.8	68.1	62.1	76.2	11.8
1952.....	398.3	72.8	62.2	81.5	11.9
1953.....	448.1	78.5	64.0	92.3	17.5
forecast					
1954.....	467.3	85.2	62.5	103.0	20.9
1955.....	503.9	90.7	63.4	114.0	25.7
1956.....	552.2	98.9	63.6	122.8	24.2
1957.....	593.9	105.0	64.2	129.1	23.0
1958.....	643.8	113.2	64.6	138.1	22.0
1959.....	697.2	122.6	64.9	149.5	22.0
1960.....	758.8	133.8	64.7	163.2	22.0
1965.....	1,034.0	183.5	64.4	223.9	22.0
1970.....	1,399.7	249.6	64.0	303.8	22.0

construction budgets lower

Capital expenditures by electric utilities are expected to decline slightly during 1954 and 1955 after reaching a peak in 1953. Most of the anticipated decrease will be because of smaller outlays for generating facilities in advance of a probable lower level of capacity additions during 1956 and 1957.

Expenditures for transmission facilities, which tend to be proportional to those for generation, are also expected to fall off slightly.

Expenditures for distribution, on the other hand, will go up. This is due to the close relationship of new distribution to the increase in small light and power and residential customers and energy sales. Total sales of energy to these two classes of customers are expected to show a record rise during 1955 which should result in a record expenditure for distribution. On the average no decrease in outlays for distribution is anticipated through 1970.

distribution budgets keep climbing — why?

capital expenditures all agencies – millions of dollars

	generation	transmission	distribution	miscellaneous	total
1948...	1,103	400	1,278	84	2,865
1949...	1,410	400	1,457	93	3,360
1950...	1,275	425	1,333	109	3,142
1952...	1,344	504	1,172	131	3,151
1952...	1,925	577	1,118	118	3,738
1953...	2,088	647	1,200	127	4,062
forecast					
1954...	2,011	665	1,190	141	4,007
1955...	1,884	660	1,260	139	3,943
1956...	1,550	542	1,290	142	3,524
1957...	1,475	534	1,400	154	3,563
1958...	1,795	628	1,570	173	4,166
1959...	2,155	755	1,690	186	4,786
1960...	2,410	844	1,860	205	5,319
1965...	2,740	960	2,040	224	5,964
1970...	3,480	1,220	2,780	306	7,786

here is how we developed our forecast ➡

over 60 million customers by 1970

residential growth rises despite recession

In this year of recession the average use of electricity per residential customer is increasing more than ever before—183 kwhr. It will reach 2,528 kwhr per customer this year. With consumer disposable income predicted to increase again in 1955, we expect a new record gain next year.

We see little prospect for a change in this trend toward new annual records and expect a 7,300 kwhr use per customer in 1970. And we have very good supporting reasons.

First of all, looking back over the past 17 years, you discover that average residential usage increased by 219%, from 735 kwhr a year in 1936 to the 2,345 figure of last year. The forecasted 1970 increase amounts to 212%.

But the main reason why the industry can look forward to a larger and larger residential market lies in the sale of appliances. Appliance sales even in this recession year have not suffered, mostly because disposable income has been stable, with tax cuts and unemployment insurance making up for the drop in industrial employment.

what will utilities do to push appliance sales?

Over the years this trend of increased kwhr usage matched against disposable income has proven a reliable indicator of future use. This continues to accelerate as people get more and more keyed to electrical living.

A study of the increase in residential sales of 1953 over 1952 revealed that over 77% of it came about from increased saturation of appliances. What makes this particularly significant is that the appliances that are the least saturated now are by and large heavy users of electricity—room coolers, dryers, heat pumps, and space heating.

the residential customers . . . .

	residential customers	population	households	population per customer	households per customer
	millions	millions	millions		
1948	33.5	146.6	42.2	4.37	1.26
1949	35.4	149.2	43.6	4.22	1.23
1950	37.5	151.7	44.7	4.04	1.19
1951	39.2	154.4	45.6	3.94	1.16
1952	40.7	157.0	46.6	3.85	1.14
1953	42.0	159.6	47.5	3.80	1.13
forecast					
1954	43.3	162.3	48.4	3.75	1.12
1955	44.3	164.8	49.3	3.70	1.11
1956	45.7	167.2	50.1	3.66	1.10
1957	46.9	169.7	50.9	3.62	1.09
1958	48.0	172.2	51.8	3.59	1.08
1959	49.1	174.8	52.7	3.56	1.07
1960	50.3	177.4	53.7	3.53	1.07
1965	54.9	189.9	58.7	3.46	1.07
1970	60.4	204.2	64.6	3.38	1.07

increased use of electric energy . . . .

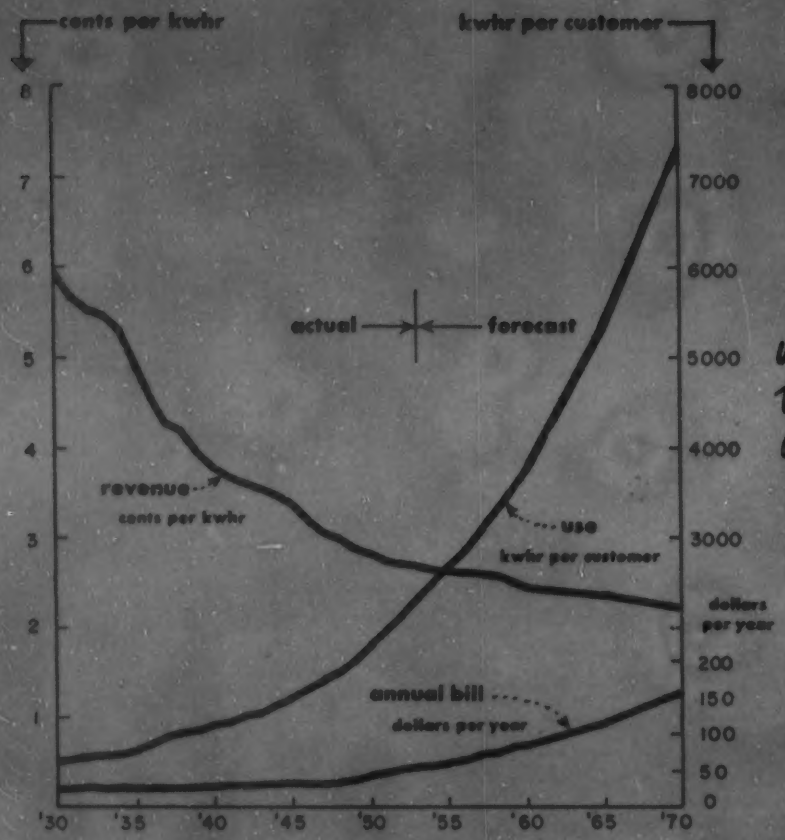
	average annual use	disposable personal income	service expenditures
	kwhr	billions of dollars*	billions of dollars*
1948	1,343	188	57
1949	1,484	188	60
1950	1,830	206	65
1951	2,004	226	70
1952	2,169	237	76
1953	2,345	250	81
forecast			
1954	2,528	253	83
1955	2,716	257	85
1956	2,913	265	87
1957	3,119	272	89
1958	3,339	281	91
1959	3,571	291	93
1960	3,821	303	95
1965	5,328	365	115
1970	7,323	442	136

*forecast in 1953 dollars

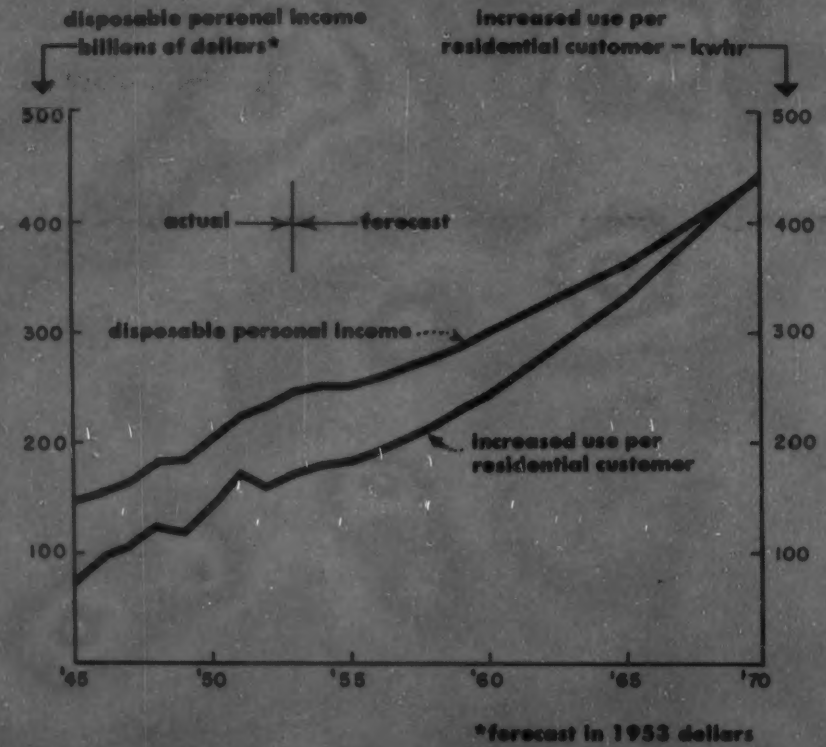
will more than quadruple residential sales

	revenue	revenue as % service expenditures	residential sales	revenue per kwhr	average annual bill
	millions of dollars		billions of kwhr	cents	dollars
1948	1,533	2.7	51.0	3.01	47.05
1949	1,717	2.9	58.1	2.95	49.68
1950	1,932	3.0	67.0	2.88	52.70
1951	2,165	3.1	77.0	2.81	56.31
1952	2,401	3.2	86.8	2.77	60.08
1953	2,658	3.3	97.0	2.74	64.73
forecast					
1954	2,921	3.5	107.8	2.71	68.37
1955	3,209	3.8	119.3	2.69	73.10
1956	3,495	4.0	131.4	2.66	77.49
1957	3,798	4.3	144.4	2.63	82.02
1958	4,116	4.5	158.3	2.60	86.83
1959	4,454	4.8	173.3	2.57	91.83
1960	4,831	5.1	190.2	2.54	97.38
1965	7,235	6.3	289.4	2.50	131.76
1970	10,092	7.3	438.8	2.30	167.09

residential use



usage will more than triple by 1970 but the average customer will pay only about 2½ times as much



a stable consumer income in 1954 helped appliance sales and in turn residential use

"the atom" spurs industrial use

Sales of electric energy to large light and power customers are increasing nearly 3% in 1954 despite an 8% drop in industrial production. And will probably increase 7% in 1955 as production starts to climb slightly.

Chief reason for increased sales to industry in these two years is the increasing requirements of Atomic Energy Commission installations. They stood at an estimated 6 billion kwhr in 1953 and are expected to rise to 19.4 billion kwhr in 1954 and 23.4 billion kwhr in 1955. Not included here are the energy requirements of Oak Ridge and Hanford.

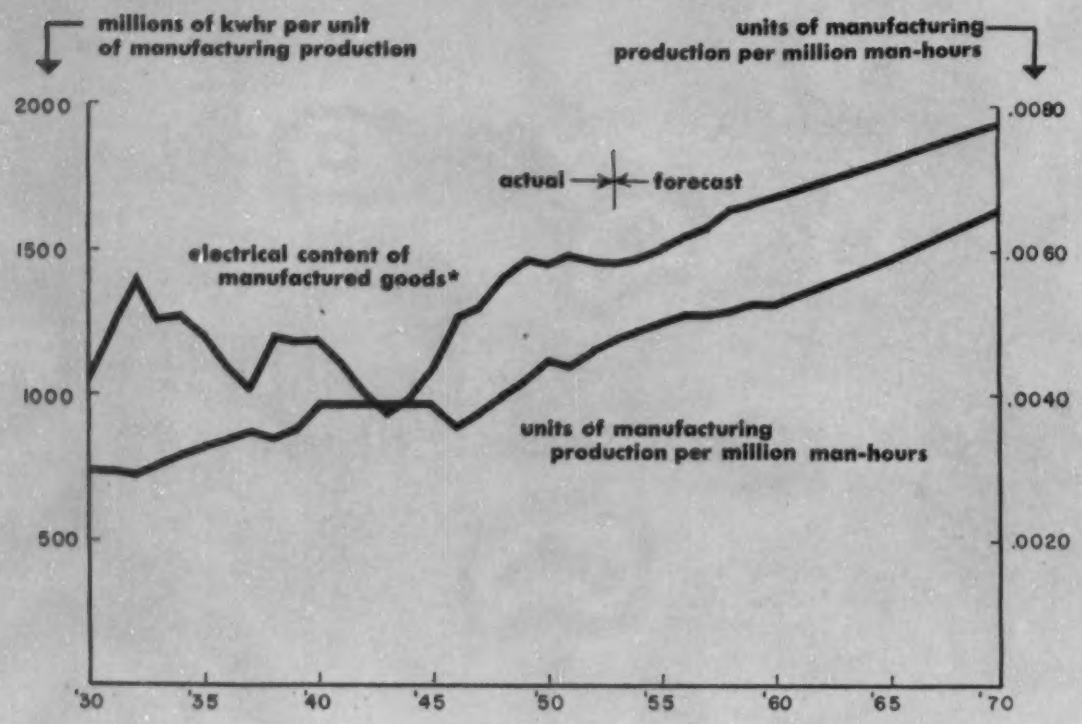
The year-to-year rise in the use of electric energy per unit of industrial production is expected to continue at the historical rate. This long term trend is largely due to the ever increasing mechanization by industry and the growth of metallurgical production. The number of production man-hours rises at a relatively slow rate (compared with production) because of the trend toward a shorter work week—35 hours by 1970.

In order to meet the demand for goods placed upon it by the quest for an increased standard of living (without a substantial increase in manpower), industry must continue to mechanize. This is a trend which brings with it a rise in the electrical content of manufactured goods. This is a trend which is slowed during periods of high level defense activity chiefly because of the enormous man-hour requirements of aircraft production.

Sales to large light and power are expected to rise from the 195 billion kwhr 1954 level to a nearly 500 billion kwhr level in 1970. A rise which will be due chiefly to the forecasted increase in the level of industrial production and industrial mechanization, increased demands by the atomic energy program, and a relatively small anticipated rise in generation by industry for its own use.

air conditioning should be included too

electric energy in manufacturing



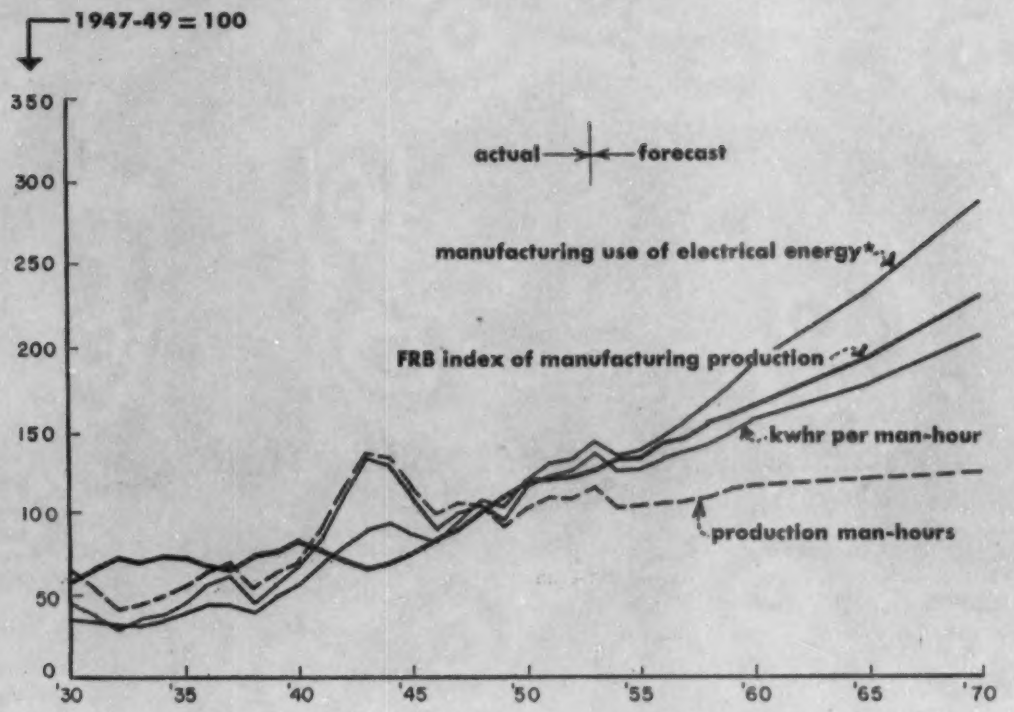
*Does not include energy used for reduction of aluminum and magnesium

industrial use of electric energy — billions of kwhr

	large light & power sales and generation by industrial plants					
	use by manufacturing	sales to AEC	use by other industries*	total	generation by industrial plants	large light & power sales
1948.....	156.0	—	22.2	178.2	54.1	124.1
1949.....	152.9	—	21.8	174.7	54.0	120.8
1950.....	177.5	—	21.1	198.6	59.5	139.1
1951.....	195.6	—	24.9	220.5	62.7	157.8
1952.....	201.7	—	29.5	231.2	63.8	167.4
1953.....	222.9	6.0	32.4	261.3	71.2	190.0
forecast						
1954.....	212.0	19.6	27.3	258.9	64.2	194.7
1955.....	220.6	23.4	30.5	274.5	67.0	207.5
1956.....	235.6	30.2	33.5	299.3	69.5	229.8
1957.....	248.3	32.7	37.0	318.0	72.0	246.0
1958.....	265.2	35.0	40.0	340.2	74.5	265.7
1959.....	282.6	38.0	43.0	363.6	77.0	286.6
1960.....	304.9	40.0	46.0	390.9	79.0	311.9
1965.....	376.6	45.0	61.0	482.6	89.5	393.1
1970.....	470.1	50.0	76.0	596.1	100.0	496.1

*Includes some sales to and generation for other customer classifications

manufacturing use of electrical energy



*Does not include energy used for reduction of aluminum and magnesium

manufacturing use of electric energy

	FRB index of manufacturing production	use of electric energy by manufacturing*	millions of kwhr per unit of manufacturing production	production man-hours	kwhr per man-hour	units of manufacturing production per million man-hours
	1947-49=100	billions of kwhr		millions		
1948.....	103	144.6	1,404	26,006	5.56	.0040
1949.....	97	141.8	1,462	23,122	6.13	.0042
1950.....	113	164.2	1,454	25,337	6.48	.0045
1951.....	121	179.9	1,486	27,268	6.60	.0044
1952.....	125	183.0	1,464	27,287	6.70	.0046
1953.....	136	198.6	1,460	28,614	6.94	.0048
forecast						
1954.....	125	185.4	1,483	25,413	7.30	.0049
1955.....	127	191.5	1,508	25,664	7.46	.0050
1956.....	132	205.8	1,559	26,167	7.86	.0051
1957.....	137	218.7	1,596	26,671	8.20	.0051
1958.....	142	233.6	1,645	27,174	8.60	.0052
1959.....	149	248.8	1,670	28,180	8.83	.0053
1960.....	157	266.1	1,695	29,438	9.04	.0053
1965.....	178	324.0	1,820	30,193	10.73	.0059
1970.....	206	400.7	1,945	31,200	12.84	.0066

*does not include power used for reduction of aluminum and magnesium. These processes requiring large amounts of power and relatively few man-hours

air conditioning boosts sl&p sales

Sales of electric energy to small light and power customers show moderate gains during 1954 and 1955. During 1954 a predicted 7% rise will boost small light and power sales to 74 billion kwhr. The anticipated 9% rise during 1955 will boost sales to 81 billion—almost triple those at the end of World War II.

Air conditioning of both new and old office and commercial buildings has been and will continue to be a key factor in the continued increase in use. The entire business district in many metropolitan areas is rapidly becoming an air conditioned city within a city. Other factors such as lighting, commercial cooking, and appliances in apartments are also important.

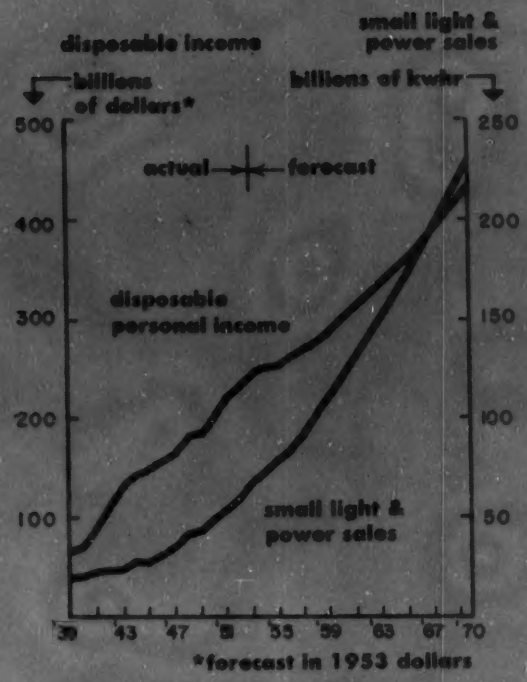
Prior to the end of World War II, gains in the sale of electric energy to small light and power customers nearly equalled those to residential customers. Since that time, however, growth in sales to residential customers has pushed them far ahead.

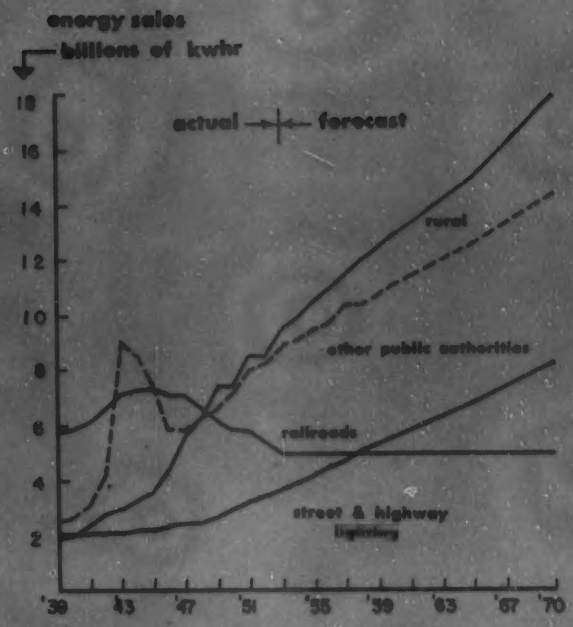
don't forget thousands of modern shopping centers

Until 1944, both classes received a nearly equal share of total sales, 15%. By the end of 1954, sales to residential customers will have risen to 27% of the total—those to small light and power to only 18%. It is anticipated that by 1970, sales to residential will reach 36%, sales to small light and power 19%.

Electrical World's forecast is based on a rise in the annual use per small light and power customer of from 12,550 kwhr in 1954 to 31,800 in 1970, indicating an average annual increase of nearly 1,200 kwhr.

Sales of energy to customers classified as rural and for street and highway lighting are expected to show significant gains during the next 16 years. Each is expected to very nearly double. It is assumed that use by railroads will continue at very nearly the same level as 1953. However, a change in the economics of railway electrification could radically alter this picture.





small light & power customers, average use, & sales

		small light & power customers	residential customers	residential customers per sl&p customer	average annual use per sl&p customer	sales to sl&p customers
		thousands	thousands		kwhr	billions of kwhr
	1950	5,446	37,533	6.87	9,320	50.4
	1951	5,538	39,225	7.10	10,452	57.3
	1952	5,636	40,768	7.23	11,106	62.1
	1953	5,843	41,982	7.16	12,018	69.3
forecast						
	1954	5,965	43,289	7.26	12,550	74.3
	1955	6,092	44,541	7.26	13,500	81.9
	1956	6,132	45,683	7.45	14,500	87.1
	1957	6,251	46,879	7.50	15,000	94.1
	1958	6,353	47,947	7.55	16,500	102.7
	1959	6,461	49,191	7.60	17,560	112.1
	1960	6,552	50,253	7.67	18,000	122.3
	1965	6,906	54,856	7.98	25,500	176.7
	1970	7,333	60,414	8.25	31,000	232.9

sales to "other classifications" — billions of kwhr

	rural	street & highway lighting	other public authorities	railways & railroads	interdepartmental	total
1950	7.4	3.0	7.2	3.9	0.6	24.0
1951	8.5	3.5	8.0	3.8	0.5	26.0
1952	8.5	3.5	8.4	3.4	0.5	26.3
1953	9.4	3.5	9.0	3.0	0.6	29.0
forecast						
1954	10.0	4.0	9.2	3.0	0.6	28.8
1955	10.5	4.2	9.5	3.0	0.6	29.9
1956	11.0	4.6	9.5	3.0	0.6	31.0
1957	11.5	4.8	10.2	3.0	0.6	32.1
1958	12.0	5.1	10.4	3.0	0.6	33.1
1959	12.5	5.4	10.8	3.0	0.6	34.3
1960	13.0	5.6	11.3	3.0	0.6	35.3
1965	15.4	6.9	12.6	3.0	0.6	40.5
1970	17.9	8.2	14.2	3.0	0.6	45.9

and electricity will get 7.3% of consumer spending for services

how's business? —1970

We believe that economic activity, as measured by Gross National Product, will pass $560 billion by 1970. This implies an average annual growth of close to 3% a year, about in line with the long-run average of the past 25 years.

Rising production and increasing output per worker are the essential factors behind this growth rate. To reach the goal, production per man-hour will have to rise by about 2.5% per year. The labor force will grow from 65 million to about 82 million. And average weekly hours will drop to about 35.

Growth will be interrupted, probably several times, by recessions like the one of the past year. But the chances are that there won't be any serious depression. Government now has powerful weapons —many of them automatic—to prevent real depression. And no political party would dare fail to use them.

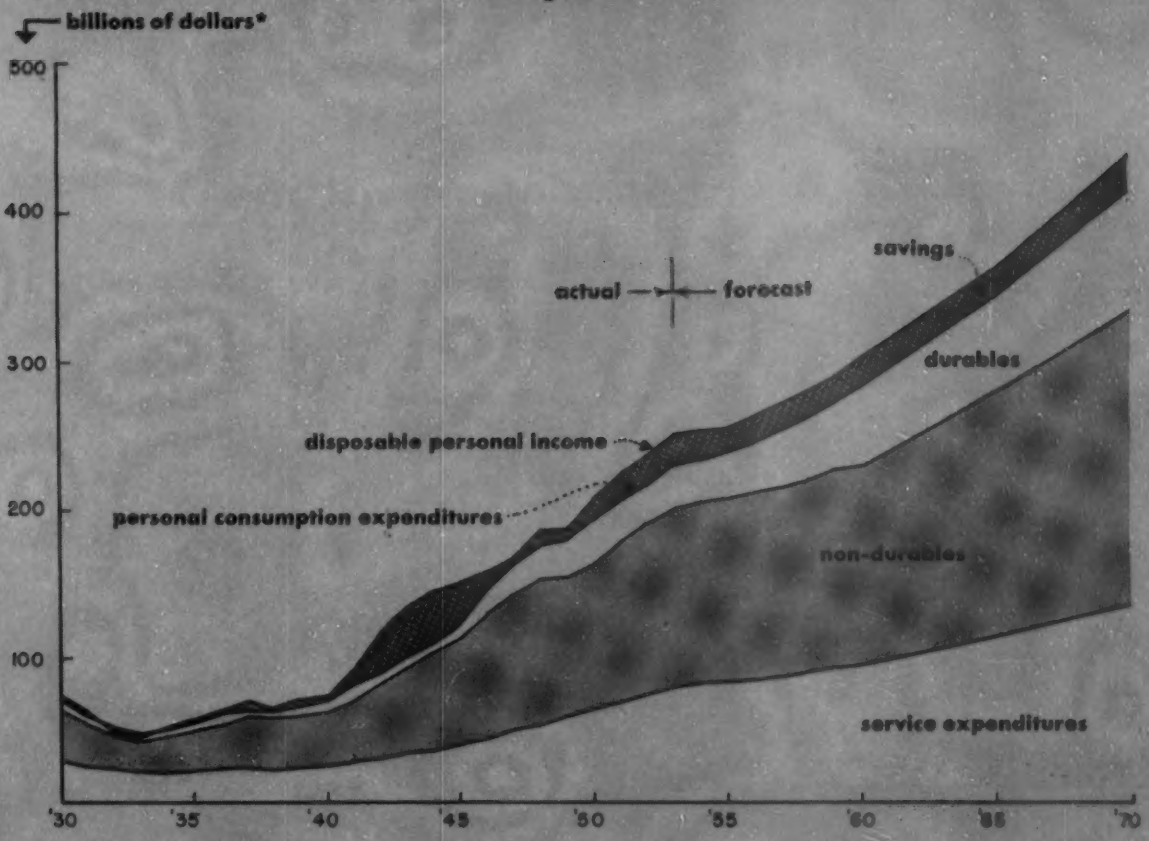
this also means lots of electrical cooling and heating

The distribution of our national product will change substantially between now and 1970. If there's no war, defense spending will get a much smaller share of GNP than today; and consumers will get a lot more.

The consumer share of GNP will be up to 79% by 1970, compared with 71% today. Consumer goods industries will have a huge market—disposable income will be about $440 billion. With a population of 204 million, that means per capita income of about $2175—almost 40% greater than in 1954.

It's difficult to foresee the details of just how people will spend their money in 1970. But consumer spending is pretty sure to turn, more and more, to things that have been luxuries in the past. They will want more comfort—which means bigger houses and more electrical gadgets to do the work.

outlook for consumer expenditures



the economic outlook

	gross national product	disposable personal income	FRB index of industrial production	home completions	family formations	households
	billions of 1953 dollars		1947-49=100			millions
1948.....	291	209	104	1,000,000	1,300,000	42.2
1949.....	293	212	97	900,000	790,000	43.6
1950.....	319	229	112	1,450,000	590,000	44.7
1951.....	342	233	120	1,200,000	690,000	45.6
1952.....	352	239	124	1,100,000	400,000	46.6
1953.....	365	250	134	1,100,000	600,000	47.5
forecast						
1954.....	355	253	123	1,100,000	675,000	48.4
1955.....	360	257	125	1,000,000	650,000	49.3
1956.....	370	265	130	950,000	600,000	50.1
1957.....	380	272	135	900,000	600,000	50.9
1958.....	392	281	140	900,000	650,000	51.8
1959.....	404	291	147	975,000	675,000	52.7
1960.....	416	303	154	1,100,000	700,000	53.7
1965.....	480	365	175	1,200,000	760,000	58.7
1970.....	562	442	203	1,500,000	975,000	64.6

McGraw-Hill department of economics

million new homes a year normal

Homebuilding will continue at as high a level as the combined efforts of vigorous competitors and favorable legislators can keep it. In the judgment of most of the experts, the resulting level will be very high indeed by any historical standards.

A good many housing experts think that one million non-farm housing starts is now a normal —not even very good—year. They expect that figure to be the floor for the near future. And for the long run the housing industry is shooting for an annual level of 1.5 million starts or more.

While the projections on the previous page are not that optimistic, they do call for 1.5 million starts a year by 1970.

With the postwar housing shortage ended, the level of homebuilding will be the result of more normal market forces. But one artificial force—easy money for guaranteed mortgages—will be a key factor in supporting the level of housing.

over one million new residential customers per year from now on

And in one important sense the housing shortage has not ended. There is still a shortage of one-family homes in the suburban areas, especially homes large enough for families with two or three children. This "shortage" is the source of much of the present housing boom's continuing vigor.

Homebuilding may be temporarily reduced within the next few years, because of the lower marriage rate. Net family formation—which was 1,300,000 back in 1948—is gradually falling and may average about 600,000 a year in the late 1950's. The rising number of older people living alone will keep annual additions to households much higher than this—but not at their recent rates (See table).

Builders are making continued efforts to improve their product. Homebuilding is finally becoming a real "consumer goods industry", with product design, advertising, and production all geared to keep sales high. Among other things, good product design will mean larger, more electrified houses, with air conditioning and plenty of appliances included.

And in the last analysis, the continued rise in personal income will be the key factor in keeping housing high. The expected rise of 40% in disposable income will allow additional millions of Americans to buy that home in the suburbs.

G-E direct-cooled field at Huntley leads way to increased generator rating

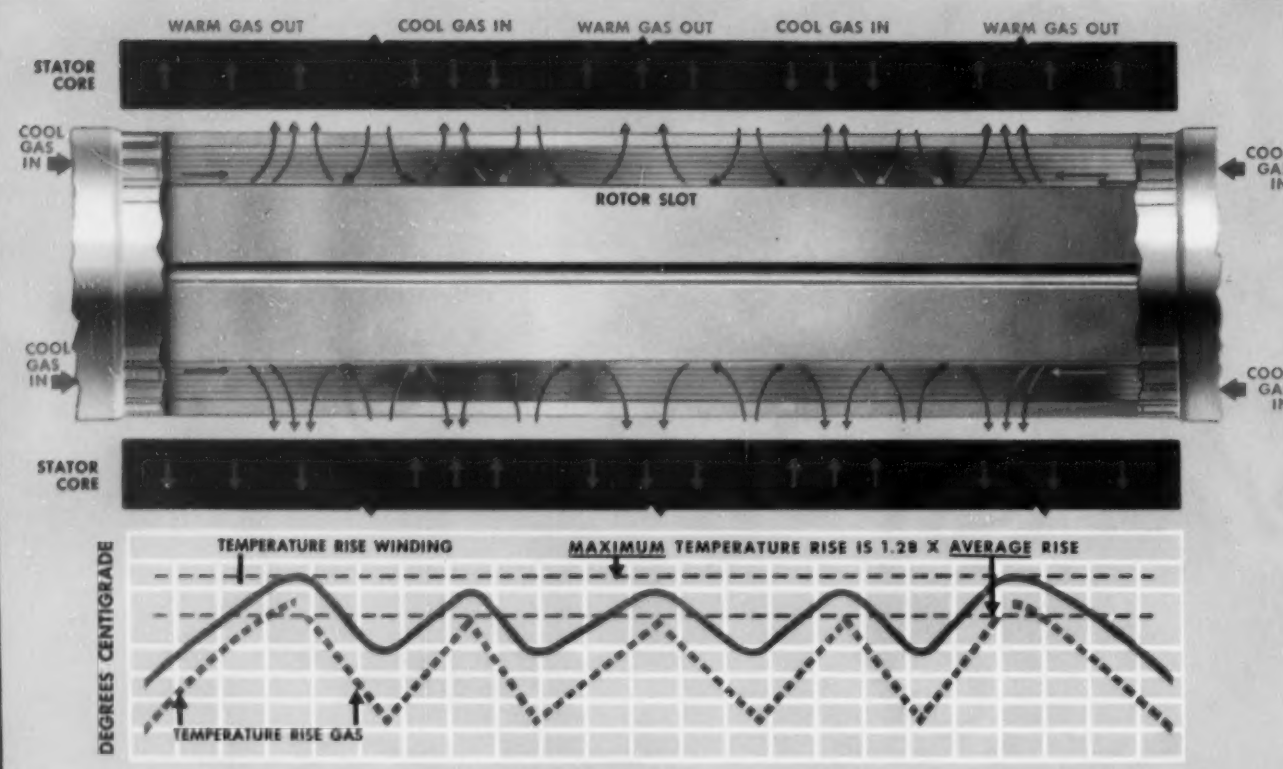
Progress in large generator design has taken another significant step forward—General Electric's direct-cooled generator field has been in successful operation at the Huntley Station of the Niagara Mohawk Power Corporation since November, 1953.

For the first time, a field employing the "air-gap pickup" type of direct cooling is being used. In the highly efficient, 125,000-kva, G-E generator at Huntley, the rotor carries cooling hydrogen gas through internal passages right in the copper winding itself. This cooling gas is forced into the windings at several points along the full length of the rotor and discharged at intermediate points.

The initial operating performance of the new Huntley generator under load further confirms the gains that were indicated in factory tests of this outstanding design. Now it will be possible to increase generator capacities without increasing frame sizes and, where desirable, reduce frame sizes for a given rating. Once again, General Electric, working with electric utility engineers, has extended the limits of generator progress. General Electric Company, Schenectady 5, N.Y.

GENERAL ELECTRIC

FOR DETAILS, TURN TO FOLLOWING PAGES...



AIR-GAP PICKUP type of direct cooling on G.E.'s generator rotor results in a very uniform temperature distribution curve. Reason: cooling gas is forced into, through and out of the windings at *several* points along the rotor. Re-circulation of warm hydrogen is insignificant because rotor inlet and outlet scoops line up in general with stator inlet and outlet ducts. Warm gas is drawn off and returned to stator cooling system.

New gas-flow design in G-E rotor improves cooling, boosts kw capacity

Direct cooling of the generator field, under development by General Electric engineers for many years, makes possible an increase in the maximum ratings of generators, and a reduction in their size and weight for present ratings.

G.E.'s solution to direct cooling of the rotor has this basic, significant advantage: cooling gas is forced into, through, and out of the windings *at several points along the entire length of the rotor*. As a result, temperature distribution is far more uniform than it otherwise would be. Additional kilowatts can be obtained from a given size generator, yet normal winding temperature is maintained.

At the Huntley Station, a conventional armature was installed, precluding an increase in machine rating. However, factory tests of the generator field, confirmed by load tests in the Huntley Station, indicate that its rating at 30 psig could be doubled; and yet the temperature rise of the field winding would still meet the conservative limits of conventional fields of the same dimensions operating at their normal ratings.

NO EXTREME FAN PRESSURES REQUIRED

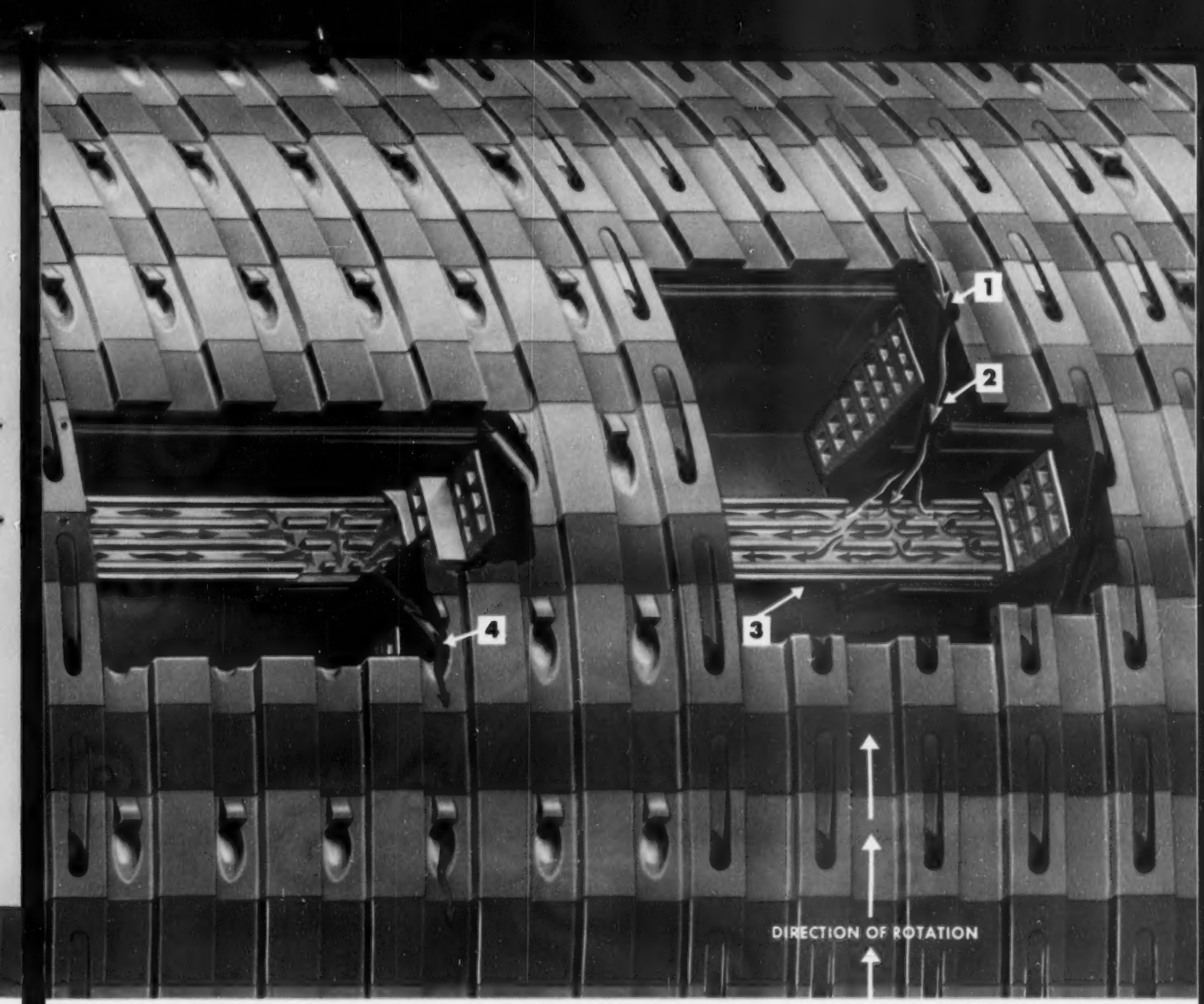
Since cooling gas does not have to be forced for great distances axially within the rotor, there is no need for high-pressure fans or blowers. The points of inlet and outlet for the cooling of the rotor line up in general with the stator inlets and outlets so that re-circulation of rotor gas is insignificant.

LIQUID-COOLED STATOR WILL BE NEXT

To keep pace with the impressive gains in rate-up proved by the generator rotor at Huntley, a direct liquid-cooled stator of 260,000-kva rating is now under construction for another electric utility. This will impressively increase kilowatt capacity relative to the machine dimensions. Through continual engineering efforts like this, General Electric is helping electric utilities to expand power systems in the most efficient way.

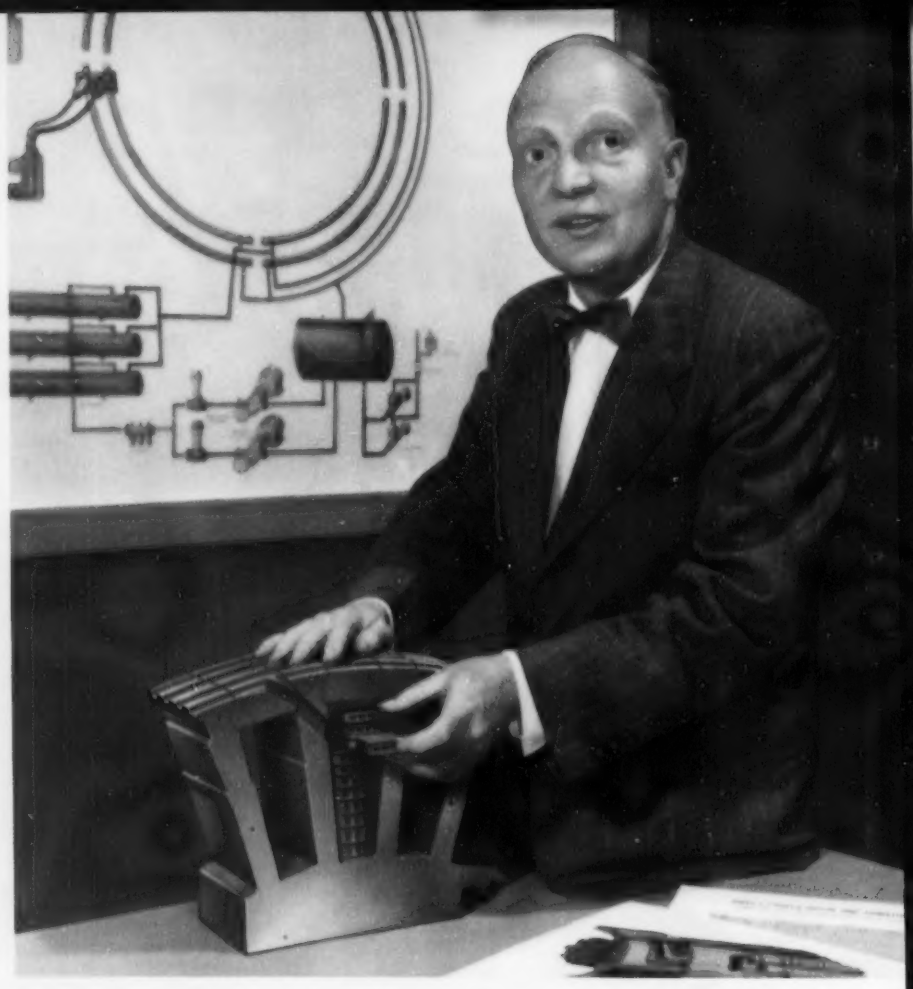
Leader in Turbine-Generator Progress

GENERAL ELECTRIC



ROTATION OF ROTOR causes scoops (1) to pick up cooling gas and carry it directly through inlet ducts (2) to the passages inside the windings (3). Flowing axially in both directions within the windings, cooling gas picks up heat directly from windings and is then returned (4) to air gap and carried through stator cooling system. Scoops are arranged so that gas is carried to all layers of the windings for the full length of the rotor.

FIRST G-E DIRECT-COOLED ROTOR is inspected by C. H. Holley, G-E generator development engineer, left; E. S. Bundy, Vice President and Chief Engineer and J. N. Ewart, Chief Mechanical Engineer of the Niagara Mohawk Power Corporation.



H. D. TAYLOR, Manager—Generator Engineering, for General Electric's Large Steam Turbine-Generator Department, answers some questions about direct cooling of the generator. Cross-section model of direct-cooled rotor shows slots inside the copper windings which carry cooling gas.

H. D. Taylor says direct cooling of rotor and stator makes

"350,000 TO 400,000-KVA GENERATORS POSSIBLE NOW"

Q. "Is the generator at Niagara Mohawk's Huntley Station the largest that can be built with a direct-cooled rotor?"

A. *"Not at all. The generator at Huntley has about 60 per cent of the rating of the largest G-E generators built to date. 'Air-gap pickup' cooling can easily be applied to the largest rotors which we now build. But remember—direct cooling of the rotor is only half the picture. By fully capitalizing the advantages of the Huntley rotor with a stator to match its output, the capacity of this machine would be at least as great as our largest present-day generators. Extending this same combination of direct cooling of the rotor and stator to machines of larger dimensions than Huntley makes the design of new generators in the range of 350,000 to 400,000-kva possible now."*

Q. "What about smaller ratings?"

A. *"The application of the same principle obviously makes it possible to build present-day ratings into machines of smaller physical dimensions and reduced weight."*

Q. "What is your opinion of the future of direct cooling for generators?"

A. *"I think direct cooling will 'snowball' the way hydrogen cooling did when it proved successful. My estimate is that direct cooling will be in general use in a few years on the largest machines; for medium and smaller units, direct cooling will be used in cases where space and weight are at a premium."*

For further information on direct cooling write for bulletin GER-886, "Direct Cooling of Turbine-Generator Field Windings." General Electric Company, Schenectady 5, N. Y. 254–10

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GENERAL ELECTRIC

New Dc Analyzer Cuts Operating Time 33%

PAUL A. OAKES, Engineer, Idaho Power Co, Boise

A new type of dc network analyzer designed and built by Idaho Power Co provides a tool for making more accurate studies and cuts operating time about one-third.

Basically the analyzer consists of 90 variable resistance units, 260 bus connections, 6 independently variable and electronically regulated voltage sources, and metering facilities for current and voltage at all points.

All components are arranged to facilitate easy and accurate operation. Metering, controlling, and adjustment are done from the main panel. All patch-cord connections are made on a separate jack panel. This leaves the main panel free from a maze of patch cords necessary in the usual analyzer study.

Both main and jack panels are covered with clear plastic backed by white paper so that the operator may use a wax crayon to identify all resistance units and buses. Crayon marks are easily erased with a soft cotton cloth. This eliminates the need for paper labels and saves time.

Bus connection jacks are arranged in vertical columns of ten each. Two single-pole sectionalizing switches in each column can divide it into three sections. Thus, panel space, connection jacks, and patch cords are conserved.

Idaho Power's board departs considerably from usual dc board practice of bussing together actual system generator internal emfs to a single, fixed-voltage source. It has six independently variable and regulated voltage sources. These sources are continuously variable from 0-1.5 per unit voltage. They have practically zero regulation for all currents in the range of 0-100 per unit current. Voltage sources also are unaffected by line-voltage fluctuation.

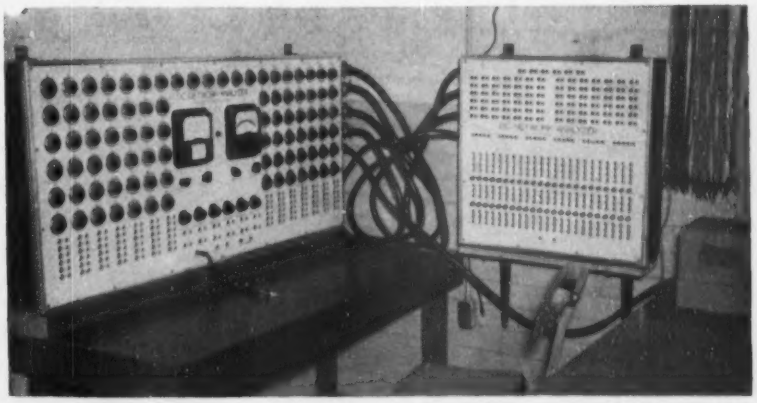
It is advantageous to have several independently adjustable and regulated voltage sources. They encourage the analyst to other refinements, such as inclusion of component of load current in phase with the average fault current, and use of resistance values corresponding to the component in phase with the total system impedance to the point in question.

These features combine to save the operator time and to improve the accuracy of the work. The operator may take reading after reading, and may move fault location or change other system conditions without continually readjusting voltage sources because of line voltage variations.

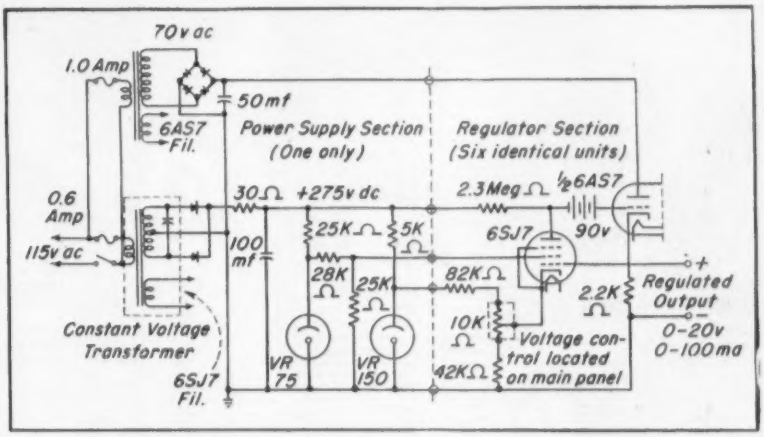
Metering is accomplished by two 20,000-ohm per v instruments, one each for voltage and current. Two ranges cover 0-1.5 per unit voltage and five ranges, 0-100 per unit current. An ohmmeter circuit built into the voltmeter aids in setting the resistance units. However, the resistance dial calibration is sufficiently accurate for most purposes. Voltage and current metering points are associated with resistance units rather than with bus connections.

This method allows metering jacks to be placed on the main panel, where they are free from the confusion of patch cords. Furthermore, it is not necessary to run duplicate pairs of leads between the main panel and jack panel for each connection. The method also reduced the number of metering points.

(*More How To on page* 142)



MAIN PANEL (left) has resistors above and on sides of meters, generator controls below meters, and metering jacks across bottom. Jack panel (center) has jacks for resistors, top; generators, middle; and buses, bottom. Voltage source is on table at right



ELECTRONIC COMPONENTS aid analyzer studies by providing six independently variable and related voltage sources. These sources are not affected by line-voltage fluctuation

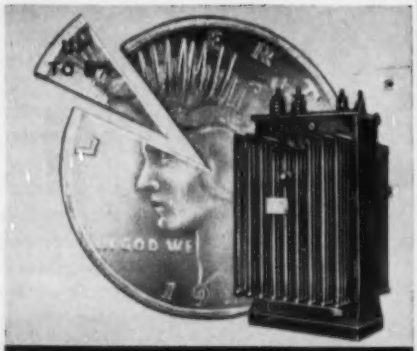
RM POWER TRANSFORMERS

the benefits of ASA standards

RM* brings you all these benefits

Repetitive Manufacture gives you the economy of a standardized product, yet with optional ratings and accessories sufficient to meet most special needs. Ordering is simpler, shipment is many weeks faster, and prices are up to 8% lower than those of non-standard units.

**RM is the G-E designation for ASA-standardized power transformers 69 kv and below, 501 through 5000 kva single-phase, and through 10,000 kva three-phase.*



LOWER PRICE

plus.....High dielectric strength

from vapor-phase drying which removes entrapped moisture

When you need a transformer in the medium range, order a General Electric Repetitive-Manufacture transformer, and you'll get all the benefits of ASA standards plus many extra advantages that give you better performance, easier handling and less maintenance.

HIGH DIELECTRIC STRENGTH, for example, and better short-circuit protection are assured by an RM production technique called ***vapor-phase drying.*** Entrapped moisture, if left in the coil assemblies, would lower the dielectric strength of the insulation. Later this same moisture could seep out—causing shrinkage, loose windings, and a weakening in short-circuit stress resistance.

Vapor-phase drying removes the moisture which is present in the insulation during manufacture. At the new Medium Transformer Plant, all units rated above 15 kv and 2000 kva are given this unique treatment which uses vapor from boiling oil. As shown at left, the hot oil vapor permeates the windings and condenses on the coils—releasing the latent heat of vaporization. It is this heat which warms the windings and insulation to the point where, in combination with a high vacuum, moisture is driven out of the structure and carried away. These "pre-shrunk" windings are then securely tightened into a compact coil stack which will remain tight in service giving maximum resistance to short-circuit stresses.

MANY OTHER BENEFITS result from the advanced methods and processes used in General Electric's new plant at Rome, Georgia. These include a stronger liquid-tight tank from submerged arc welding, superior rust prevention because new Super Melaglyp lasts up to 150% longer, quicker delivery from faster, conveyorized production. Built solely to produce power transformers in the medium transformer range, this plant serves utilities and industries by turning out better products in shorter time. You can get full information about RM power transformers by contacting your nearest G-E Apparatus Sales Office, or by writing for Bulletin GEA-6108 to General Electric Company, Section 422-11, Schenectady 5, New York.

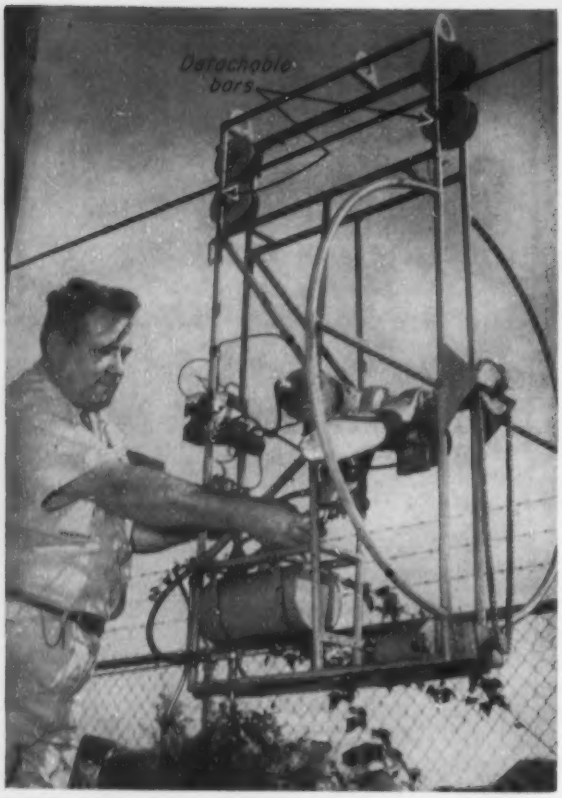
Progress Is Our Most Important Product

GENERAL ELECTRIC

SIMPLIFIED PURCHASING

SHORTER SHIPMENT

G.E.'s NEW ROME, GA., TRANSFORMER PLANT—built specifically to meet the growing trend to standardized power transformers.



SALVAGED ENGINE from drone target plane powers device that strings lead-in cable. The stringer zips along an existing conductor

Propeller Drive Speeds Stringing in Difficult Terrain

Stringing of additional conductors where one line already exists is speeded through the use of a propeller-driven wire stringer devised by Hawaiian Electric Co, Honolulu. The device is particularly applicable in areas where lines traverse difficult terrain. In use the wire stringer has zipped across 4,000 ft stretches of conductor in 2.5 min.

Heart of the device is a 7.5-hp gasoline engine from a drone plane used for target shooting. The complete assembly, including fuel tank and ignition system, is mounted on welded pipe frame that rides on four guide wheels on an overhead conductor. As shown in the illustration, the lower wheels are attached to removable bars that bolt to the frame. This allows the device to be put on or taken off the conductor.

In operation a ⅛-in. airline stringing cable, fed from a 4,000-ft, 120-lb reel, is attached to hooks on the back of the frame. The wire stringer is mounted on the de-energized conductor, started, and allowed to run the length of the span.

So far the device has pulled-in seven miles of lead-in cable along a 4/0 line. Experience shows the stringer to work best along open line, although it can chop its way through very small branches. The stringer was devised by John Ramos, assistant overhead construction superintendent for Hawaiian Electric.

Hydraulic Jacks Simplify Regulator Field Inspections

HEINZ STEUER, Engineer, Transformer Section, Allis Chalmers Mfg Co, Milwaukee, Wis.

One man can easily raise regulator mechanisms for inspection and maintenance with the aid of a pair of light-weight, hydraulic jacks developed for use by Allis Chalmers field men. The jacks eliminate the need for crane trucks and other accessories and avoids the necessity of moving the regulator since routine inspection and maintenance can be handled with the regulator in place.

The inspection jack is designed to be used on single-phase station and distribution regulators having unit-type construction, where all components are cover-suspended and untanking requires only the removal of main cover bolts. However, they can also be used with the other types of regulators once the main covers have been removed and the internal connections have been unbolted in preparation for lifting the mechanism.

The inspection jack has a capacity of 5,000 lb and consists of two hydraulic units which are adjustable to get the full 36-in. lift from 43 to 84½ in. The units are placed

Fault Locator Pinpoints Hurricane Damage to Line

Spotting a 115-kv line break caused by Hurricane Carol with an electronic fault locator was accomplished by Connecticut Light & Power Co within 20 min. In so doing service restoration was speeded, several crews normally required for patrolling were released for other emergency work, and many man-hours of patrolling were saved.

Operating on a radar principle, the locator sent out an impulse on the line between Montville power plant near Norwich and Southington substation. The return signal appearing on the oscilloscope screen, having a distance calibration, showed the type of fault and its location to be 10.8 miles east of Southington substation.

A trouble crew, which was immediately dispatched, found the break in the indicated area and repaired it hours sooner than could have been done without the locator. As many as six crews would have been required to patrol the 47 miles of line. Majority of patrolling would have had to be done on foot as line is mostly in woods.

This was CL&P's first emergency use of locator.

OVER 1½ MILLION new room air conditioners will be installed this year—latest industry estimate.

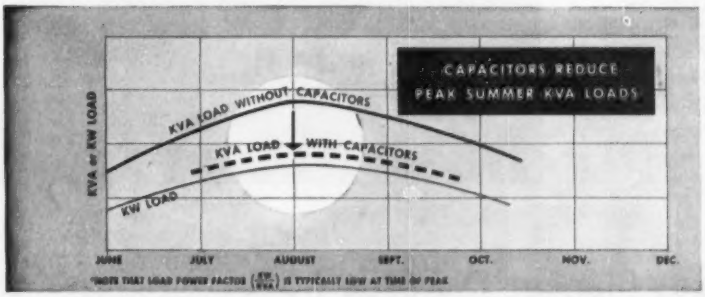
Heavy air conditioning loads need not tax your system capacity

G-E Capacitors can release extra system capacity in voltage and thermally limited circuits

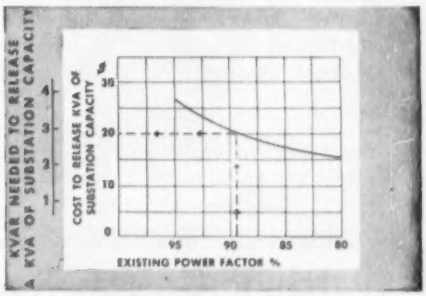
THE MOST ECONOMICAL solution to low power-factor air conditioning load problems is offered by G-E capacitors. Installed in fixed and switched banks on overhead distribution circuits and distribution substation busses, capacitors reduce kva loading of overhead lines and substations. And the switched capacitors can help regulate voltage—keeping voltage up right out to the ends of feeders.

BENEFITS FROM CAPACITORS (1) they allow two to three times more load to be carried on voltage-limited circuits. (2) Capacitors release thermal capacity—permit substations to carry more kilowatts. (3) They often pay for themselves out of savings resulting from reduced system I^2R losses.

FOR YOUR SEASONAL AIR CONDITIONING LOAD PROBLEM investigate General Electric capacitors. For full information, get in touch with your G-E Apparatus Sales representative. *General Electric Co., Schenectady 5, N. Y.* 441-13



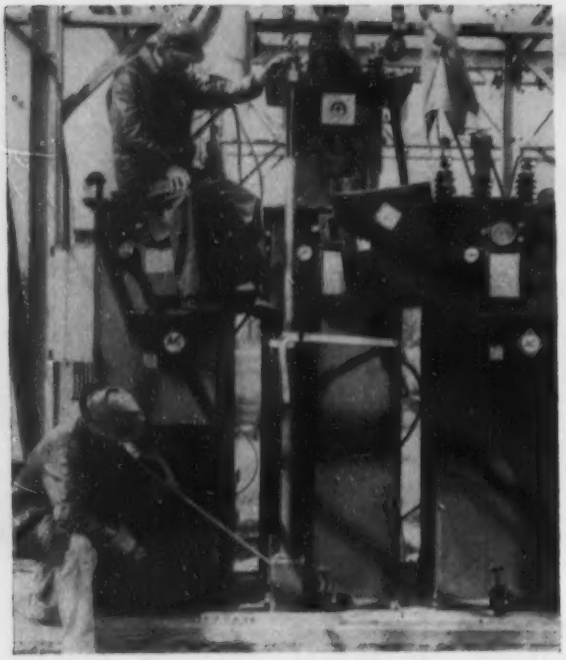
SUMMER PEAKS equaled or exceeded those of December in approximately 50 utilities last year, and these are low power factor peaks as shown above—a direct result of increased air conditioning loads.



WHAT IT WILL COST YOU. At 89% power factor, $20 of primary capacitors will release one kva of system capacity.

Progress Is Our Most Important Product

GENERAL ELECTRIC



on opposite sides of the regulator cover and operated simultaneously to raise and expose the operating mechanism.

For regulators requiring removal of covers and unbolting of parts inside the tank, a cross-arm is placed between the jacks straddling the regulator. Lifting clevises are attached from the cross-arm to cover lifting eyes, providing lift directly at the cover and permitting full use of space above the regulator for untanking.

Use of this equipment in the field has shown that the inspection, including 30 min for untanking and retanking, can be done in from four to six man hours. Thus, the time required for the entire operation can be reduced by as much as 20 man hours.

Weight of the jacks, 230 lb, is broken down so that the heaviest component is approximately 60 lb. This can be handled by one man and is small enough to be hauled in the trunk of a passenger car.

Jacks can also be used on distribution transformers, small power transformers, and other equipment of similar design.

HYDRAULIC JACKS make inspection and routine maintenance of regulators easy. The work can be done without moving the regulator

Lazy Susan Carries More Meters Safely

Eleven meters instead of six are stored and carried in a "lazy susan" meter cabinet installed on service trucks of Puget Sound Power & Light Co, Seattle. The installation was designed by Herb Ballard, meter supervisor of Puget Power's Northern Division.

The cabinet has three revolving shelves made of sheet iron. Each shelf has three holes padded with sponge rubber. There is sufficient vertical separation between shelves to allow the storage of all types of socket meters used in the division. And only one size hole was needed because Puget Power uses meters with the same size socket. Any meter may be removed by turning shelf.

Two additional meters are held in padded housings at the bottom of the cabinet. During transit when the door is closed, the shelves are automatically locked in place.

REVOLVING SHELVES in meter cabinet store nine meters in holes padded with sponge rubber. Two meters are at bottom of cabinet

Patching Defects Reduces Blanket Discards 65%

Rubber blanket discards have been reduced 65% in Dayton Power & Light Co's operations by vulcanizing small defects with a 115-v electric vulcanizer.

First step is to enlarge the hole and remove carbon surrounding it with a punch. Both sides of the blanket are then cleaned thoroughly with xylene. The surface is then roughened and the dust is cleared away. A rubber solvent is applied.

Grade A belt splicing tie gum 0.02 in. thick is cut up, and tiny pieces are used to fill the hole made by the punch. Pieces are packed tightly with a small tool.

The patch is then built up three layers thick on the beaded side of the blanket starting with a patch ¼ in. in diam, followed by ½-in. and ¾-in. diam. Each layer is pressed firmly and "rolled in". A single patch ⅜ in.

(*Continued on page* 150)

G.E. designs light, compact, 5 KV current transformer with high resistance to corrosion

One third smaller and lighter, the new butyl-molded, outdoor, Type JKW-3 transformer is easier to install and maintain.

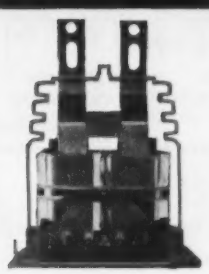
Almost completely corrosion-proof, this new General Electric current transformer is the first butyl-molded transformer designed for 5000-volt outdoor application. This revolutionary design has virtually eliminated maintenance. **CORROSION-RESISTANT** materials are used in all exposed metal parts. The case and primary bushing are butyl rubber. The butyl also serves as insulation and as an important factor in the new Type JKW-3's high mechanical strength.

EASIER TO INSTALL, this new G-E current transformer can be mounted in any position for bottom-, side-, or top-connected installations. The lightweight and smaller size facilitates installation and handling.

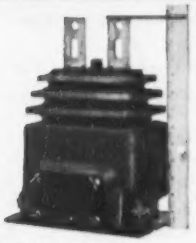
ACCURACY CLASSIFICATION of the Type JKW-3 transformer is 0.3 at burdens: B-0.1 to B-2.0. Ratings are from 10 to 800 amperes.

FOR MORE INFORMATION, contact your nearest G-E Apparatus representative, or write for Bulletin GEC-1222 to: Section 604-40, General Electric, Schenectady 5, N. Y.

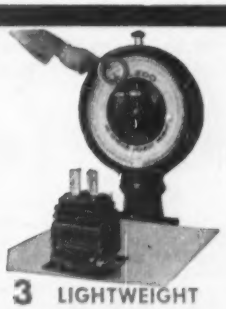
GENERAL ELECTRIC



1 BUTYL-MOLDED



2 COMPACT
only 12¾ in. high

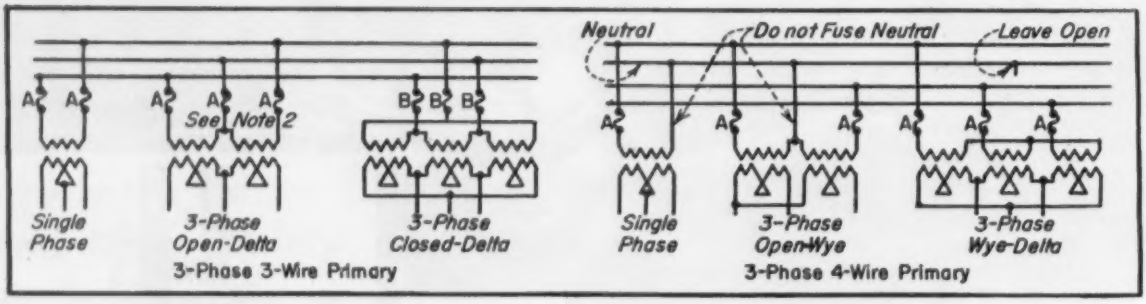


3 LIGHTWEIGHT
only 42 lbs.

Type K Fuse Link Sizes for Transformers

Recommended standard fuse link sizes are listed for full-load currents of 1.5-167 kva distribution transformers in three primary voltage classes. This tabulation is an adaptation from distribution standards of Electric Power Board of Chattanooga, Tenn.

Transformer Connections



Type K Fuse Link and Transformer Sizes

Transf. Size, kva	Type K Fuse Link Size 2,400v A Full Load Current	A Fuse Size, Amp	B Full Load Current	B Fuse Size, Amp	7,200v A Full Load Current	A Fuse Size, Amp	B Full Load Current	B Fuse Size, Amp	12,000v A Full Load Current	A Fuse Size, Amp	B Full Load Current	B Fuse Size, Amp
1.5	0.63	15	1.08	15	0.21	6	0.36	6	0.13	6	0.23	6
3	1.25	15	2.17	15	0.42	6	0.73	6	0.25	6	0.43	6
5	2.08	15	3.61	15	0.69	6	1.20	6	0.42	6	0.73	6
7.5	3.13	15	5.41	15	1.04	6	1.80	6	0.63	6	1.09	6
10	4.17	15	7.22	15	1.39	6	2.41	6	0.83	6	1.44	6
15	6.25	15	10.80	25	2.08	6	3.60	10	1.30	6	2.25	6
25	10.40	25	18.00	40	3.47	10	6.01	10	2.08	6	3.60	10
37.5	15.60	40	27.10	65	5.21	10	9.02	15	3.12	10	5.40	15
50	20.80	40	36.10	65	6.94	15	12.00	25	4.17	10	7.20	15
75	31.30	65	54.10	100	10.40	25	18.00	40	6.25	15	10.70	25
100	41.70	100	72.20	140	13.90	25	24.10	65	8.35	25	14.45	25
167	.....	.....	.....	.....	.....	.....	.....	.....	13.90	40	24.10	65

1. Fuse links as listed shall conform to EEI-NEMA standards for distribution fuse links, Type K (fast). Complete range of preferred current ratings are as follows: 6, 10, 15, 25, 40, 65, 100, 140 and 200 amp.
2. Where transformers of unequal size are in three-phase banks, fuses in primary legs should correspond to respective transformer sizes, the larger size transformer governing the size of fuse in common legs.
3. Fuse sizes specified herein are for average conditions, for transformers on 12-kv system, refer to system operating department, because in some cases, departure from table is necessary to obtain proper co-ordination.

GREATER FLEXIBILITY AND LOW COST PROTECTION WITH "SL" INTERRUPTER SWITCHES

Not just an interrupter—not just a disconnect—but a combination that breaks loads safely—and when equipped with power fuses you get full system protection.

"SL" interrupter switch with selector and grounding switch (fully interlocked)

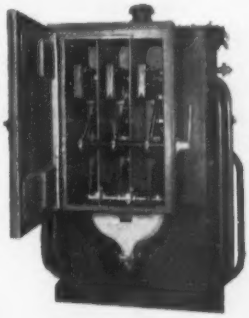
When specifications call for opening of circuits under moderate load you will find Delta-Star type "SL" interrupter switches will meet the requirements perfectly. Used with power fuses, they provide an economical means of fault protection.

Units are available in voltage ratings of 5, 7.5 and 15-kv. with interrupting capacities of 400, 200 and 100 amperes respectively. Continuous capacity of switches may be as desired since the main switch is independent of the interrupter. Furnished with or without metal housings in single, two or three pole units for mounting on transformers, walls or structures.

Load interruption is accomplished by momentarily shunting the full load current through a by-pass circuit. Here the arc is extinguished by rapidly elongating it within a confining chute. Danger of external arcing or contact burning is eliminated.

THERE IS AN "SL" INTERRUPTER SWITCH FOR EVERY APPLICATION

For complete information consult our nearest representative or ask for Publication 4612.

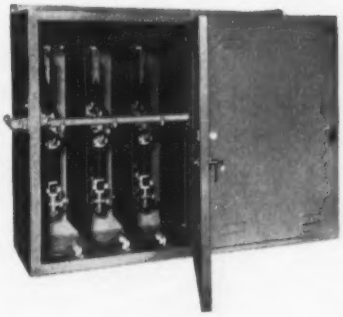


"SL" interrupter switch mounted directly on transformer

Terminators can be arranged on top or bottom of interrupter housing and furnished in several different arrangements for single feeder, looping circuits, etc. Units are easily operated by direct handle or hook-stick as preferred.

Heavy gage steel cabinets for both indoor and outdoor service

Large doors provide easy access to equipment for inspection and maintenance. Door handles on all indoor metal enclosed units are of the key type. Padlock clips are provided for locking handle in open or closed position.



Interrupter in combination with power fuses for fault protection

Each operating handle is equipped with a latch to prevent blade opening under short circuit currents. The latch is released by means of a trigger located on the operating handle and can be padlocked to prevent unauthorized operation.

DELTA-STAR ELECTRIC DIVISION

H. K. PORTER COMPANY, INC.
OF PITTSBURGH
2437 Fulton Street • Chicago 12, Illinois
District Offices in Principal Cities

Pace-Setting Power

75,000-kw unit at Wisconsin Power and Light Company's new Rock River Station combines first side-crossover tandem-compound steam turbine and modern supercharged hydrogen-cooled 3600-rpm generator

FOR YEARS the demand for electric power has continued to soar in the industrial-agricultural area served by the Wisconsin Power and Light Company. To match the growing load, this pace-setting Allis-Chalmers turbine-generator combination was recently placed in operation at the new Rock River Station near Beloit, Wisconsin.

The 75,000-kw tandem-compound turbine at Rock River is representative of Allis-Chalmers double-flow, 3600-rpm reheat turbines for ratings of 75,000 to 150,000 kw. The generator incorporates supercharged internal rotor conductor cooling — operation-proved since 1951 at Wisconsin Power and Light's Edgewater Station. A duplicate 75,000-kw unit for the Rock River Station is under construction.

You can depend on Allis-Chalmers for pace-setting turbine-generator units engineered to meet your requirements — in ratings up to 500,000 kw. For more information, contact your nearby A-C representative. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4383

Turbine Innovations

Side crossovers simplify removal of upper casing for inspection and enhance turbine appearance... double-casing HP cylinder... patented isothermal reheat diaphragm . . . all-steel LP casing . . . simplified main oil-pumping system with basement-located oil tanks and centrifugal pumps . . . more instrumentation and control at No. 1 pedestal.

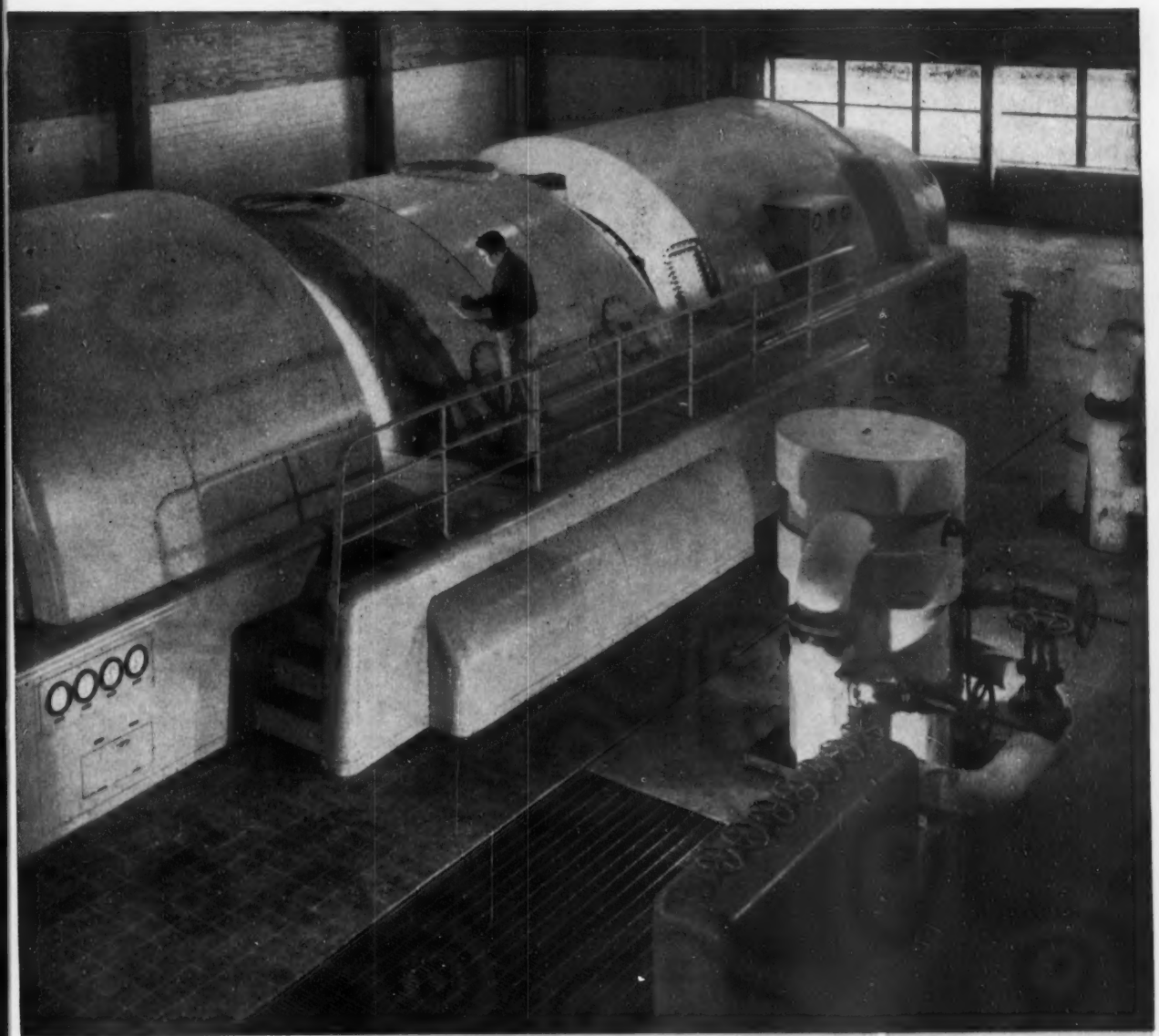
Generator Features

Supercharged cooling permits reduced plant size, lower foundation and crane costs, and smaller breakers and bus structures . . . flexible stator core support design . . . thrust-type shaft seals . . . simple, centralized hydrogen control mounted on generator.

1904 50 1954
YEARS
TURBINE

ALLIS-

Combination



Steam conditions for this 75,000-kw, 3600-rpm turbine are 1450 psig, 1000 F inlet, 1000 F reheat, 1.0-inch mercury absolute exhaust. Generator rating is 12,500 volts, 0.8 short-circuit ratio, 75,000 kva at ½-pound hydrogen pressure, 93,750 kva at 30-pound hydrogen pressure.

A-C ALLIS-CHALMERS

CHALMERS

Patching Defects

(*Continued from page* 144)

in diam is applied to the other side of the blanket. The single patch allows the blanket to lay flat against a metal plate when tested. Use of a starch cloth prevents sticking of the tie gum to the hot surface while the blanket is positioned in the vulcanizer.

Blanket patching requires care and skill to give proper protection. The patch requires 13 to 14 minutes on one side and 7 to 8 minutes on the other side.

Blankets are tested at 15,000 v. Patches have been tested up to 31,500 v which is the maximum voltage obtainable with the testing apparatus. Linemen are satisfied with the protection provided.

Care is taken to see that a blanket not suitable for return to service is properly identified.

VULCANIZING BLANKET is done with a small 115-v vulcanizer, following careful build-up and preparation of the patch

Mid-Span Service Tap Saves Setting an Additional Pole

MID-SPAN take-off rack eliminates poles and avoids property overhang with services

R. W. WESTPHAL, Engineer, Consumers Power Co, Jackson, Mich.

A mid-span service rack installed on three-wire secondaries is used by Consumers Power Co to meet numerous requests from field men for a suitable customer service support other than at a pole.

There are two principal advantages of the rack. It can be placed on secondary wires at any location between existing pole supports and thus save setting a pole. Also, it provides a means for clearing obstructions or eliminating private property overhang with service conductors.

The rack is made up of a ½-in. by 19-in. galvanized iron rod with an upset head on one end. Three 2¼-in. by 2⅛-in. standard spool insulators are placed on the rod with a round washer on either side of each of the three spools. Spools and washers are held in position by means of cotter keys inserted through holes drilled so that the distance between spool centers is 8 in., the company's standard conductor spacing. The 2½-lb assembly is supplied by the manufacturer as a unit.

Unit is installed and the service tap made with a standard light-weight utility service truck equipped with an extension ladder. The application is limited to one unit per span not exceeding 150 ft in length, or two balanced three-wire, open or cabled, services not exceeding 100 ft in length. It is not installed on secondary conductors smaller than No. 3 WP copper or No. 2 WP ACSR.

Two services are installed, where possible, in opposite directions from the secondary lead resulting in a nearly balanced load at the point of attachment. A single service tap pulls the secondary conductors away from a straight line, however, not to an extent that it is objectionable from an aesthetic point of view. Under heavy loading conditions and with two balanced mid-span service taps, tension of the secondary conductor would not exceed 60% of its ultimate strength.

While excellent for use on secondary lines along streets and roads, the rack is not as readily adaptable along rear property lines because these locations are not accessible to the ladder truck.

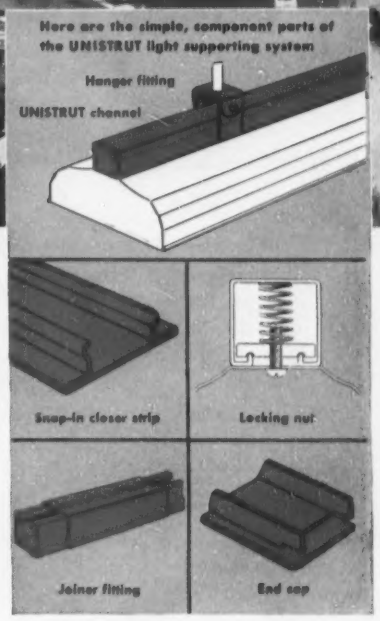
Vault Signal Lights Save Checking Time

A system of time-saving indicator lights has been connected to each of 54 transformers in Toledo Edison Co's downtown network to show if a transformer is in service. Circuits for the lights are brought out of the transformers and up to the lights that are located below the sidewalk at the edge of the manhole opening.

With the lights, a workman can drive to the curb alongside the manhole to see if the transformer is in service. Previously, he had to go into the manhole and peer through a glass on the side of the transformer protector.

(*More How To on page* 154)

Installation by: Hultgren Electric Corp., Electrical Contractors, Chicago, Illinois.



50% Savings!

Lighting installed at half the cost with UNISTRUT® *channel and fittings*

New fluorescent fixtures were recently installed on two floors of the Butler Brothers Building, Chicago, Illinois. The savings on this UNISTRUT installation over conventional methods was estimated at fifty percent. How did UNISTRUT reduce installation costs?

By using UNISTRUT channel with its continuous slot to attach fixtures quickly in perfect alignment. And by using the same channel as a wireway. This fast, easy method cut costly installation time in half!

UNISTRUT channel insures true alignment. It provides the utmost in safety because the entire row of fixtures forms a single integrated unit. Fewer hanger rods are needed and a neater, more attractive installation results. Stems or rods may be placed at any point along the channel, permitting installation on irregular ceilings. Fixtures can be fastened in a continuous row or intermittently as shown here.

Get in touch with your UNISTRUT Distributor for the full, cost-cutting facts on light supporting with UNISTRUT framing.

UNISTRUT®

U. S. Patent Numbers 2327587 2329815 2345650 2363382 2380379 2405631 2541908 Other Patents Pending

The World's Most Flexible All-Purpose Metal Framing

Distributors and warehouse stocks in principal cities. In Canada, Northern Electric Company. Consult your telephone directories.

Approved by—
UNDERWRITERS' LABORATORIES, Inc.
as a *Surface Metal Raceway!*

UNISTRUT channel and fittings have been approved by Underwriters' Laboratories, Inc., for wiring lighting installations as well as for auxiliary power wiring.

Write today for *free* fluorescent lighting bulletin.

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Company.....

Address.....

City.....Zone....State.....

Seventeen years ago

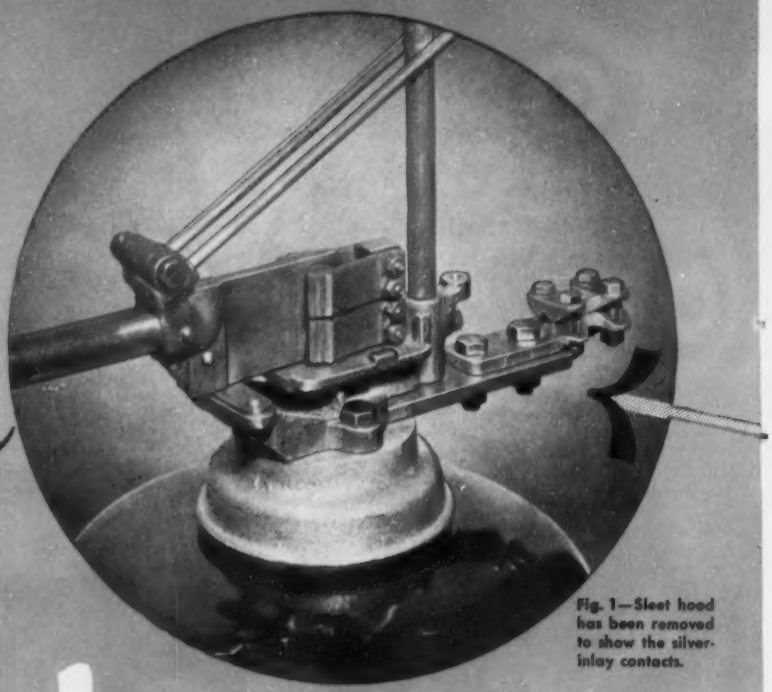


Fig. 1—Sleet hood has been removed to show the silver-inlay contacts.

HI-VOLTAGE STANDARDIZED ON SILVER-TO-SILVER CONTACTS

here's why . . .

1 **SILVER is by far the BEST** conductor of electricity of all metals.

2 **SILVER assures ZERO MAINTENANCE** of contacts because the oxides and sulfides of silver are, for practical purposes, as efficient conductors of electricity as silver itself. Fig. 4 on the opposite page shows the resistance characteristics of various types of contacts.

3 **SILVER-TO-SILVER contacts have LESS** friction. Recent tests in our Laboratory show that the Coefficients of Friction of various metals used as switch contacts are:

Copper against Copper —.177
Copper against Silver —.174
Silver against Silver —.160

4 **SILVER means TROUBLE-FREE** performance. In over seventeen years, Hi-Voltage records do not disclose a single case in which a Customer has ordered a set of *Silver* contacts for replacement. And Hi-Voltage Switches are operating in all climates and atmospheres.

HI-VOLTAGE

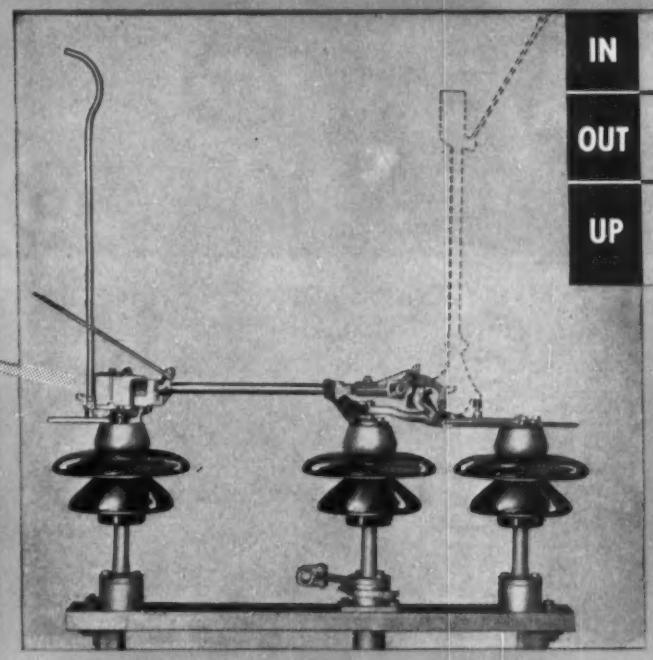


Fig. 2

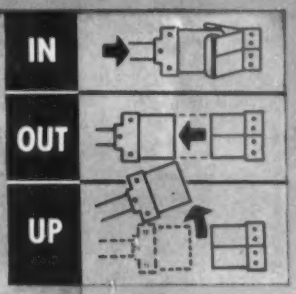


Fig. 3

EXCLUSIVE "IN-OUT-UP" ACTION

When closing, switch blade *pushes* directly and horizontally into the silver-inlay contacts. When opening, switch blade *pulls* directly and horizontally from the silver-inlay contacts. Then, the switch blade is automatically lifted to the vertical position by the powerful operating mechanism. *There is no twisting or turning.*

SILVER'S THE ANSWER . . .

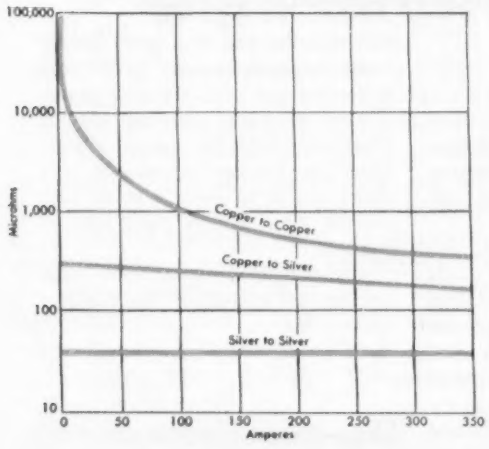


Fig. 4—When copper-to-copper, copper-to-silver and silver-to-silver contacts are oxidized or sulphided, their resistances change as shown above. Note the **CONSTANT** and **LOW** resistance of Silver-to-Silver Contacts.

Fig. 5

These Hi-Voltage silver-inlay contacts (unretouched photograph) underwent six short circuits of from 51,000 to 61,000 amperes . . . just about three times the NEMA test requirement. They are unmarked and are good enough to be part of a new switch.

HI-VOLTAGE EQUIPMENT COMPANY

4000 EAST 116TH STREET • CLEVELAND 5, OHIO

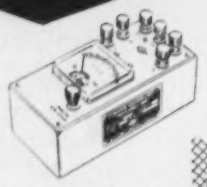
Investigate

these

METER TESTING ACCESSORIES

Now in use by Leading Utility Companies

FIELD TEST SET



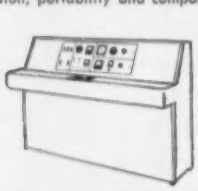
This instrument is a simple, inexpensive, portable means whereby the customer's current transformer installation may be quickly checked for basic sources of trouble.

POTENTIAL SWITCH for METER TESTING

This is a special form of the well-known snap action Micro Switch; needs only 6 ounces of pressure to operate it; long lived — modified to suit the requirements of manual control of rotating standard potential.

INSULATION TESTER

Developed in response to the need for an insulation testing device that would have: maximum safety, instantaneous indication, direct reading in megohms without calculations, ability to discriminate between a complete insulation breakdown and leakage through insulation, portability and compactness.

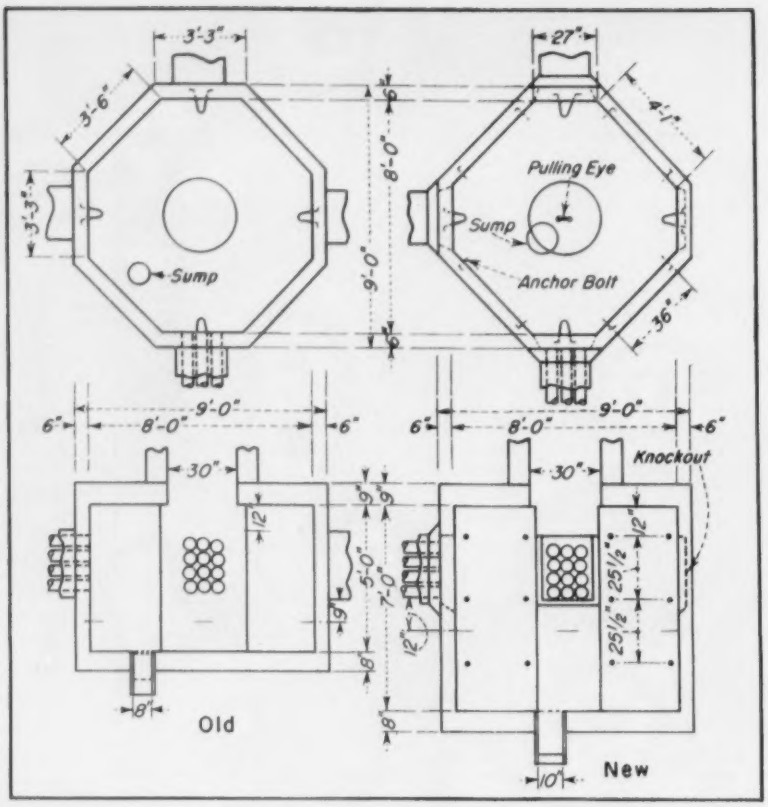


METER TESTING POWER SUPPLY

The purpose of this apparatus is to furnish a stable and controlled source of single phase potential and single phase current for general testing purposes, together with means for adjusting the phase angle so that power may be supplied at any desired power factor, leading or lagging.

Write for Complete Information

EASTERN SPECIALTY CO.
PHILADELPHIA 40, PA.



OLD AND NEW MANHOLES differ in many respects. New manhole has longer racking walls, more head room, and pulling eye in center of the floor. Duct faces are recessed

Manhole Design Gives More Space

E. J. BEST, Distribution Engineer, Southwestern Gas & Electric Co., Shreveport, La.

Several improvements were made in manhole design when Southwestern Gas & Electric Co made extensive changes in their underground network system.

Manholes were reshaped so that racking walls were longer, giving splicers more working space. Sides where ducts enter the manhole were shortened, and the duct faces were recessed into the wall. This increased bending radius of cables entering the manhole. Head room was increased from 5 ft to 7 ft, improving working conditions and making it possible to increase vertical spacing between cables.

A pulling iron was installed in the floor at the center of the manhole. This has proved of great help in cable pulling operations although experience indicates that these pulling irons should be countersunk in the floor to keep them out of the way.

The sump was moved from a location near the wall to a point directly under the manhole cover. Conditions in the network area are such that it is often necessary to pump out the manholes. With the sump directly under the manhole opening it is a simple matter to lower a pump hose into the sump without going into the manhole.

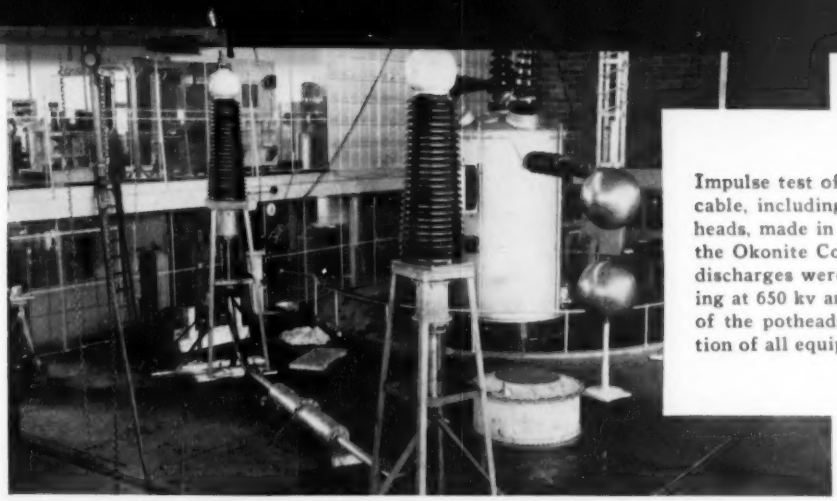
Anchor bolts to support cable racks are installed in manhole walls during construction.

Shop-Assembled Arms Save Crew Time

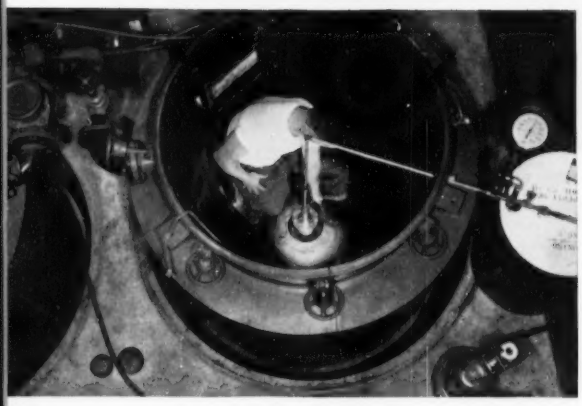
Special crossarms for mounting potheads are made up in the Cincinnati Gas & Electric Co shops with the aid of templets to save crew time.

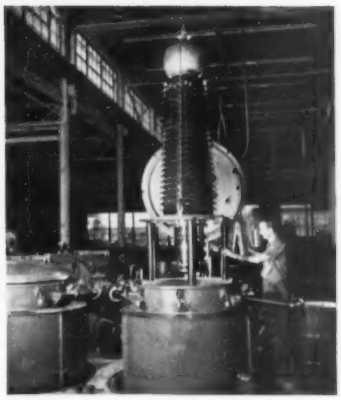
Arms are drilled accurately using a templet, which eliminates the necessity of measuring each arm. Pothead mounting brackets, pothead grounds, and pothead mounting bolts are in-

(*Continued on page* 159)



Impulse test of a section of 230-kv Oilostatic cable, including a splice, and two of the potheads, made in the Ohio Brass laboratory for the Okonite Company. A total of 196 impulse discharges were imposed on this set-up, starting at 650 kv and increased until the flashover of the potheads was reached. Later examination of all equipment showed no deterioration.





In order to withstand the maximum working oil pressure of 275 psi in the Oilostatic pipe type cable system, each O-B pothead is given a severe test. Starting at room temperature, the pothead is put under an internal pressure of 500 psi. With this pressure maintained, the temperature is raised to 65-70° C. Total duration of the test is 24 hours. At least eight hours of this time the pothead is under full temperature. Throughout the test, pothead must retain this pressure without any loss.

Holding both high voltage and high oil pressure-permanently!

Start with all the requirements for a 230-kv bushing -- add to these the function of a terminal for a pipe system working at 275 psi oil pressure -- pass a proof test of 500 psi oil pressure, with absolutely no leakage -- then be sure of retaining all these characteristics indefinitely. This is the job assigned to the O-B potheads which are an integral part of the Oilostatic high pressure pipe-type cable system to be installed in the Cubatao Underground Hydro-Electric plant of the Sao Paulo Light & Power Company in Brazil; a subsidiary of Brazilian Traction, Light & Power Company, Limited, of Toronto, Canada.

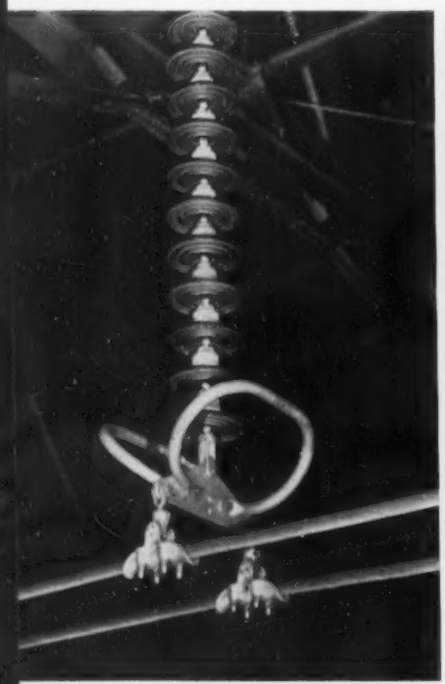
Potheads, piping, and cable are all parts of the complete Oilostatic system, and our cooperation with the Okonite Company extended far beyond that of simply coordinating the two engineering efforts. This, according to the cable manufacturer, is the pioneer of its type in the Western Hemisphere, and many of the techniques required extensive laboratory tests. For this broad development work, the facilities of the O-B High Voltage Laboratory were made available to the Okonite Company, as they are to all members of the electrical industry.

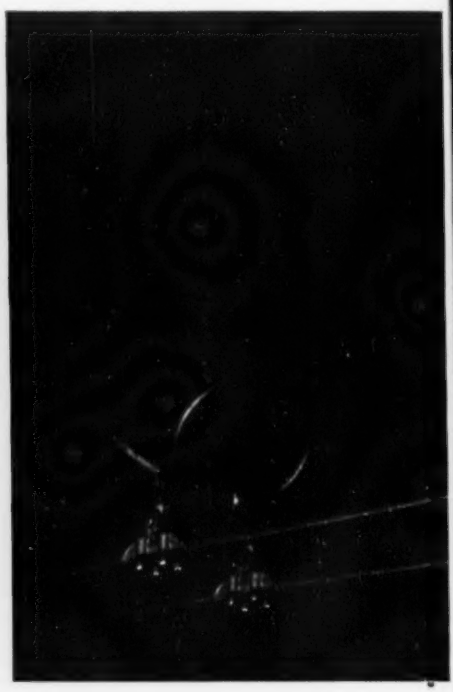
A willingness, as well as the ability, to explore uncharted territory often in company with other able organizations, is something you can't see in the ordinary O-B product. But this attitude of looking ahead -- of having tomorrow's tools on hand when they are needed -- and possessing the facilities and manpower to do the job effectively, all add up to Technical Competence, the heart of every Ohio Brass insulator.

TECHNICAL COMPETENCE the heart of every Ohio Brass pothead

The "future" of multiple-conductors is already two or three years old!

High voltage corona tests performed in the course of investigating various multiple-conductor phenomena in the O-B Laboratory. Data: Each series of photos shows the test set-up, one with and one without control rings. Succeeding pictures illustrate wet and dry corona at 330 kv, line-to-ground. Cable: 1.108 "drake" with armor rods. In addition to visual observations as shown here, advanced instrumentation was used to make precision measurements of radio influence in full daylight.



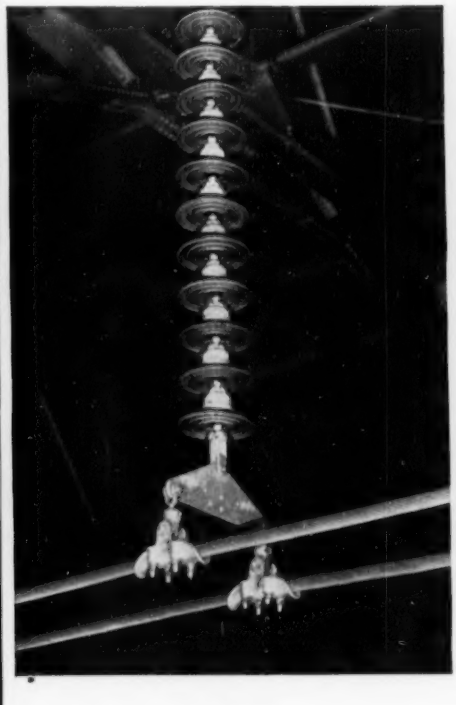


In addition to those lines in operation today above 300 kv, a number of larger power projects are actively considering such transmission voltages. Among the many problems they have presented to our High Voltage Laboratory is that of investigating the feasibility of multiple-conductors.

Here is a unique combination for such forward-looking research; sufficient floor space to mount the massive specimens under workable tensions, 60-cycle testing capacity more than adequate for the highest voltages, and measuring instruments for radio influence even into the 300-kv range.

Probably more important, however, is the human factor. Multiple-conductors present special problems of insulation and hardware working in conjunction. At O-B, development engineers and laboratory technicians habitually think in such terms because of the dual roll the company plays in supplying the electrical industry. And, as a valuable by-product of our many tests has come an uncommon knowledge of hardware requirements for multiple-conductors, ready for the builder of such lines when it is needed.

Those men who see a great future in this type of construction have, in our laboratory, an institution ready to serve them where that "future" is already two or three years old! Again, this emphasizes the important fact that factories and tools are only the machinery of the insulator and hardware business -- Technical Competence is the heart of it!



the heart of every Ohio Brass insulator

Sensitivity of this low-amperage magnetic circuit for measurement of watt-loss in clamps has a very practical aspect. For example: a given size clamp of all-ferrous composition shows a 40-watt loss at 400 amperes. The equivalent clamp with a non-magnetic (aluminum) body, but still retaining the ferrous keeper-piece and U-bolts, shows a 2-watt loss. Substitution of non-ferrous U-bolts reduces the loss to ½-watt; and finally, substitution of an aluminum keeper-piece brings the loss to zero. Since the last two items are non-standard and not useable in standard ferrous clamps, the buyer would complicate his stocking and pay a premium to gain only an additional 5 per cent saving in heat-loss. Because we have been able to evaluate this condition accurately by means of a precision test, we have retained ferrous keeper-pieces and U-bolts in our non-ferrous clamps in the interest of greater convenience and economy for the user.

High-Power Transmission Line on a table top

How would you measure a one-half watt increment of clamp loss in a 400-ampere circuit -- measure it easily, that is? Losses in high-power testing equipment would smother the result. But you can use just two amperes and, with a magnetic loop use it 200 times, except that the slight equipment losses are now easily determined and rejected in the final answer.

Magnetic loops, in principle, are "old shoe" around an electrical laboratory. However, the few measurements ever made on hardware watt-loss employed high amperage with the cumbersome Calorimeter method until we were forced by circumstances to find a better way. This came about by our development of non-magnetic hardware and, with it, the necessity for conveniently-obtained data.

Today, the technique we developed for watt-loss measurement has become adopted throughout the industry because of its simplicity and precision.

Not everything we do in our laboratory is necessarily new. Sometimes we go right back to the first chapter in the book for the basic principles which, when ingeniously applied to new problems, put that indefinable extra into our product -- Technical Competence.

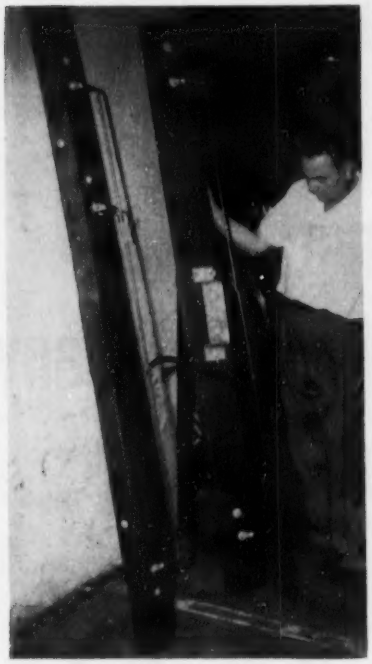
TECHNICAL COMPETENCE

the heart of all Ohio Brass hardware

4414-H

Shop-Assembled Arms

(*Continued from page* 154)



stalled in the shop, with templets.

All joints on pothead grounds are compression joints and lugs. A templet is used for spacing the lugs. Another templet, with lever arrangement, bends the No. 2/0 copper ground wire easily and accurately. This is done by bolting the templet to the table, laying the wire on it, and pulling the lever.

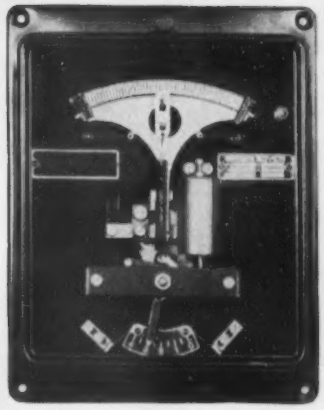
When assembled crossarms are taken on the job, pothead installations can be made more quickly and easily by line crews.

Skid-Mounting Makes Unit More Versatile

Skid-mounting makes it easier to locate a gas-engine air compressor where it is needed at the Baker River hydro plant of Puget Sound Power & Light Co. The unit may be hoisted easily onto a small car for use on railroad trestle work, or placed on a two-wheeled trailer for use at the dam or in the company's warehouse and carpenter shops.

Engine for the unit was salvaged from a model B Ford "speeder" used to haul ashes at Puget Power's steam plant in Seattle.

a jewel* for TOP QUALITY



MODEL JS 1/1

BROWN BOVERI VOLTAGE REGULATOR

*A pair of these floating, cup-type **sapphire bearings support the main arbor; another, the auxiliary arbor** of Model JS 1/1. Glass and similar substitutes are often used for these bearings **but Brown Boveri, — for greater shock- and vibration-resistance — uses jewels since sapphires don't wear or crack.***

BECAUSE of its sound engineering, fine craftsmanship and quality, users of Brown Boveri Generator Voltage Regulators report 20 years and more of trouble-free operation. While this may seem unusual, it is not exceptional. Once these regulators are installed, they will operate for long intervals without the slightest maintenance.

Model JS 1/1 is a "tailor-made" regulator . . . yet it is available from stock. Its resistance is computed individually to fit the saturation curve of the exciter. Its precision-fabricated parts — like the sapphire bearing (above) — are designed for maximum wear and accuracy . . . one of the many reasons why Model JS 1/1 is the leading voltage regulator in its class . . . for generators up to 438 kVA.

If you are concerned with sensitivity, accuracy, maintenance-free service, get all the facts about Model JS 1/1. *Write today!*

BROWN BOVERI

BROWN BOVERI CORPORATION

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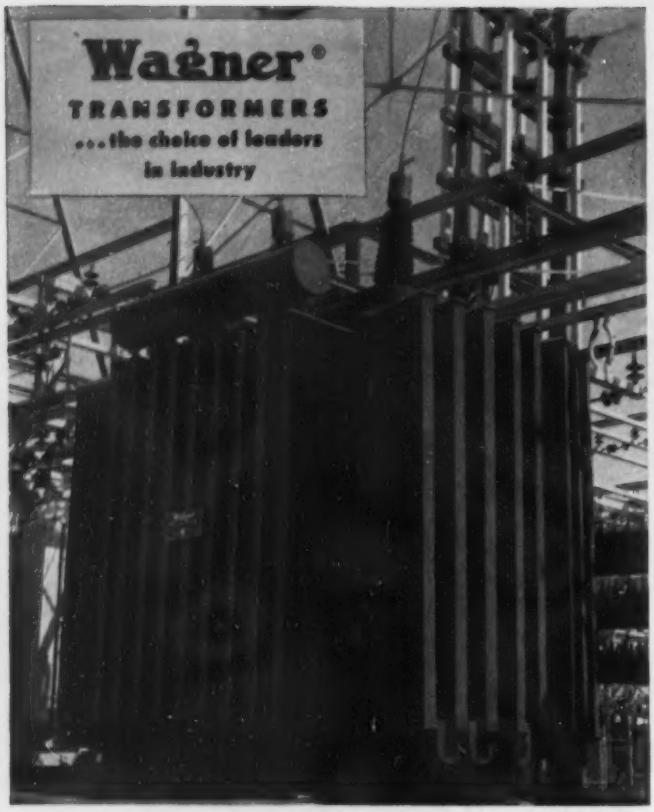
SALES OFFICES



Wagner Transformers installed at Aluminum Company of America Rockdale, Texas smelting plant

A bank of four Wagner Power Transformers has recently been installed in the main substation at the Rockdale, Texas smelting plant of the Aluminum Company of America.

Each transformer is rated 25000/33333/41667 kva, 138,000 to 13,800 volts.

Wagner Transformers were chosen for this installation, as they are for many power companies and industrial plants, because of their ability to give reliable and economical service over unusually long periods of time.

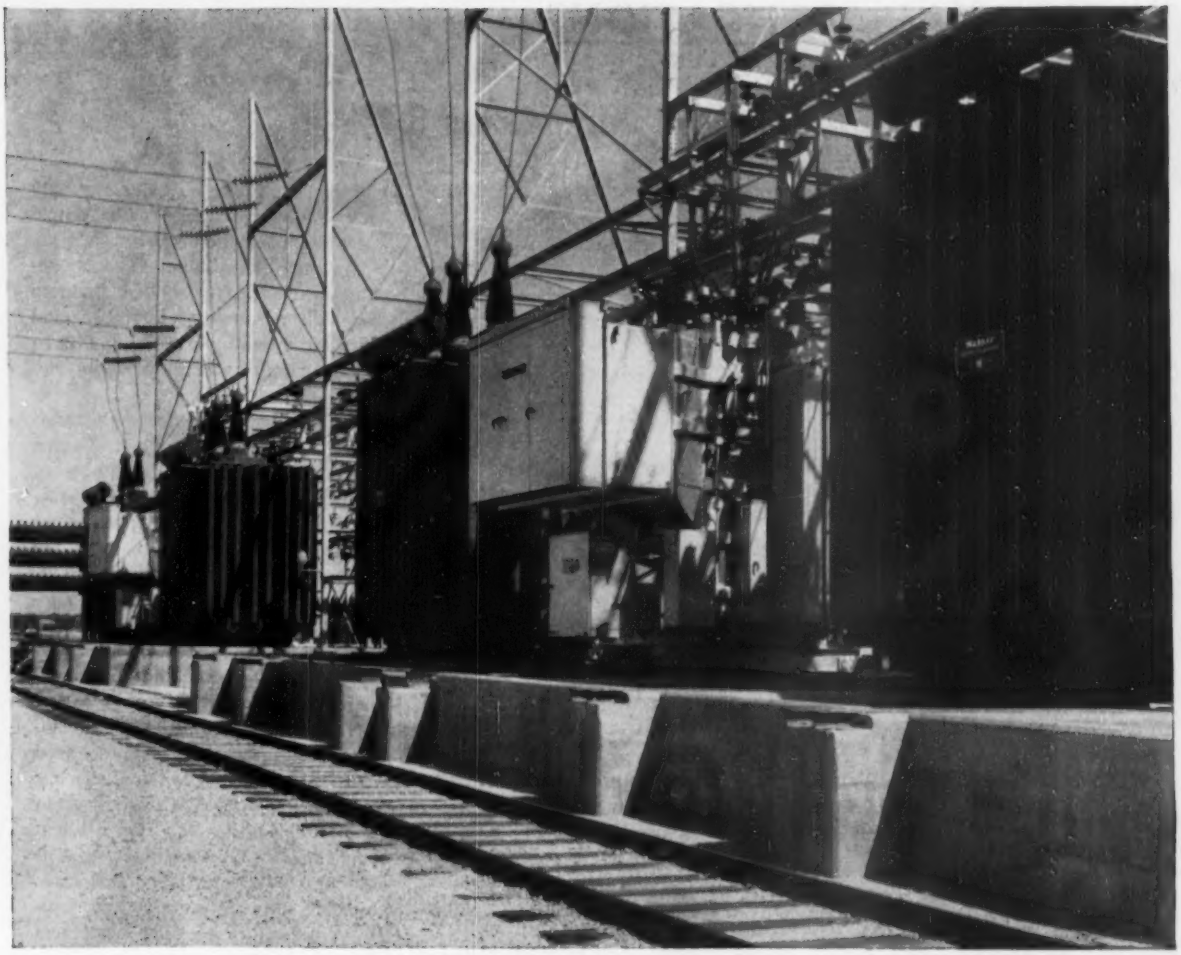
Wagner Power Transformers have been serving the power industry since 1891. Service records from the field, dating back more than sixty years, prove that thousands upon thousands of Wagner Transformers are giving thoroughly dependable service.

Why not look to Wagner for your next power transformer installation? There is a Wagner field engineer near you who will be glad to offer his services as a consultant.

* * *

If you need power transformers rated 10,000 kva and below—three phase, or 5,000 kva and below—single phase, why not check ASA C57.12b Standards and use them as your specifications? In addition to saving the cost of preparing specifications, you will also realize a substantial saving in price by using Wagner Standard Transformers.

T54-13



Wagner has all the manufacturing facilities and years of engineering "know-how" necessary to build power transformers in the ratings required for modern power systems. Branch offices are maintained in 32 principal cities, for quick, convenient engineering service and consultation.

Bulletins TU-180 and TU-181 give full information on Wagner Power and Distribution Transformers. Write for your copies today.

Wagner Electric Corporation
EST. 1891

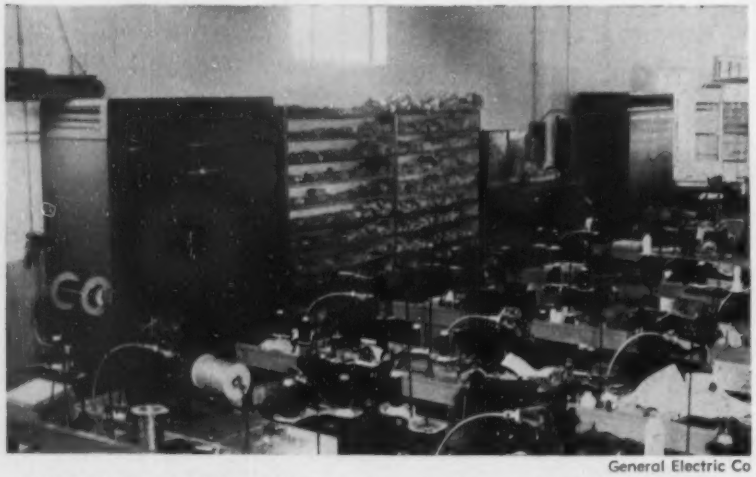
WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

INDUSTRIAL APPLICATIONS

Heat Pumps Cut Air Conditioning Costs 30%



General Electric Co

AIR-SOURCE HEAT PUMPS provide automatic year 'round heating and cooling to all-electric shoe factory. Constant temperature and even level of humidity make shoe hides easier to work

Automatic heating and cooling of the Virginia Shoe Co, Fredericksburg, Va., with 17 5-ton, packaged air-source heat pumps saves 30% in operating costs over a conventional fuel-fired system. Annual cost for heating and cooling the plant is estimated at $2,500 by the local utility.

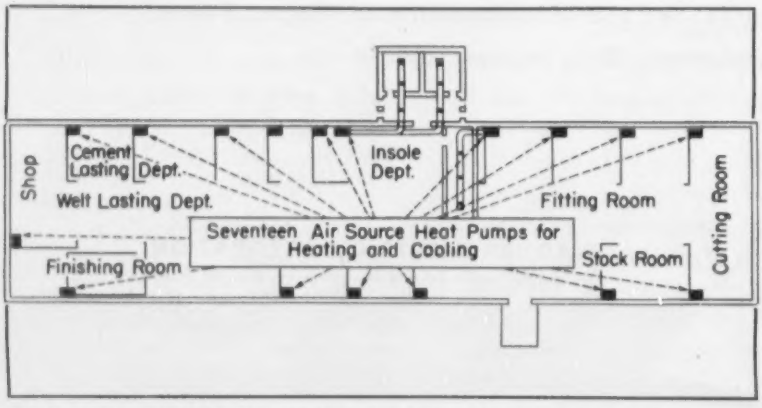
In addition to employee comfort and morale, company officials report that maintenance of a constant temperature and an even level of relative humidity is especially important in shoe manufacture. Hides used in shoes are easier to work in a controlled atmosphere and a product of more consistent quality is possible. Because the units were completely packaged and required only electrical connections, the entire system was installed in three weeks using only two skilled installers and two helpers.

The air conditioning was designed on the basis of 95 F dry bulb, 78 F wet bulb, which is standard for the area. The seventeen heat pump units have a total installed cooling capacity of 85 tons of refrigeration. All units are located in space around the outside walls with 5 in. between the units and walls. Short stub ducts supply each individual unit with ample amounts of outdoor air.

This company is housed in a one-story insulated cinder block building in which production, assembly, and office areas total more than 25,000 sq ft. The company employs about 300 people.

Individual zone control was necessary throughout the plant. Gluing and drying operations use 29-kw of resistance heaters and some 132 fractional horsepower motors operate the company's machines. To meet the widely varying heating and cooling requirements imposed by this equipment, each heat pump has its own thermostatic controls to automatically adjust its performance to the actual needs of the area it serves.

The above mentioned 30% advantage over a conventional fuel-fired system is due in part to the all-electric nature of the factory. The boost given its power load by the use of heat pumps assures the company that it will receive the most favorable rates which the utility is permitted by regulatory authorities to offer customers in that bracket.



ALL-ELECTRIC SHOE FACTORY floor plan showing locations of the 17 air-source heat pumps. The one-story insulated cinder block building has 25,000 sq ft and employs about 300 people

Electric Drying Saves $75 Monthly

Drying sizing on braid in oven with 20 kw in electric heating units in place of gas has stopped material damage, cut maintenance costs and made possible better temperature control at the F. E. Plankenhorn Braid Works, Williamsport, Pa. Company estimates use of electricity for the process saves about $75 per month over what it had spent for gas: $50 by preventing soot damage to braid which the gas had inflicted; $25 in labor costs for cleaning the oven and burners.

Electric units maintain even heat and positive temperature controls, too —something that was not attained with gas. Annoying fumes which in the past had made several employees ill, also were eliminated. Ken Breon, Industrial Power Representative, Pennsylvania Power & Light Company, Williamsport, Pennsylvania.

DEEP DEEP GROUNDING

INSURES EXTRA PROTECTION

• Heat treated, alloy steel driving stud resists mushrooming — can be used over and over. Couplings of rugged Silicon Bronze.
• Completely copper-covered machined point speeds driving. All rod sections are threaded on both ends for use as top, intermediate or bottom section.
U.S. BLACKBURN
Permanently Moist Soil

Blackburn Sectional Rods Get Down Into The Permanently Moist Soil

Drive down to permanently moist soil that gives lower earth to rod resistance. Actual experience shows a few dollars invested in deep grounding has saved thousands of dollars in overhead burn-outs.

- **BLACKBURN** Sectional Rods have a uniform coating of highly conductive corrosion-resistant copper, molecularly bonded to *rigid steel core.*
- Driving studs and couplings interchangeable with all standard sectional ground rods.
- Available through Electrical Distributors.

JASPER BLACKBURN CORPORATION
35 Madison Street • St. Louis 6, Missouri
Phone MAin 1-2821

BLACKBURN Sectional COPPER BONDED GROUND RODS

Distributed on the West coast by KORTICK MFG. CO.

Simple, low cost way
TO KEEP NUTS TIGHT

Whether you build equipment, or buy equipment, specify PALNUT Lock Nuts to assure tight assemblies for the life of your equipment. Cut down troubles — reduce maintenance — improve operating characteristics.

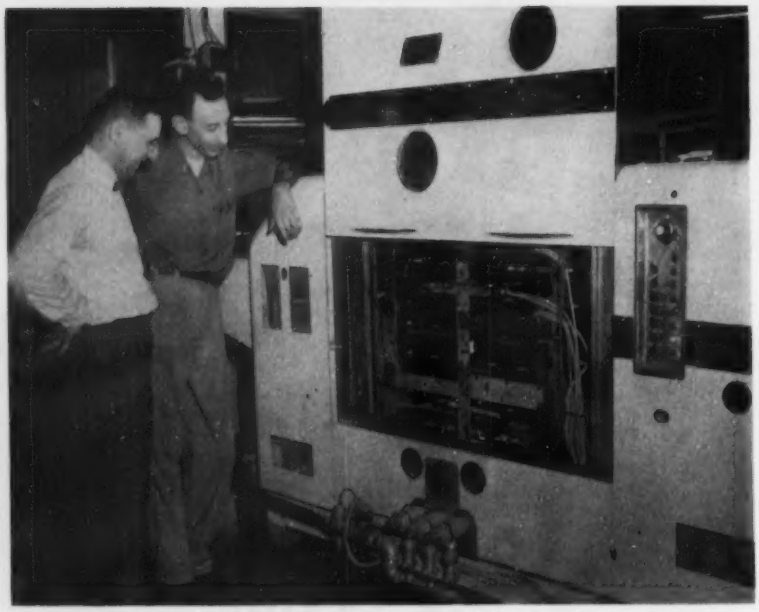
PALNUT Lock Nuts cost little, apply fast, exert a double locking spring action that prevents nut from loosening and bolt from backing out. Require only 3 bolt threads. Easily removed and re-used when servicing.

Widely used in Utility field

PALNUT Lock Nuts have been used for years on wood pole, steel towers, fittings, connectors, switches, hardware, transformers, etc. Parkerized and hot dip galvanized steel; also silicon bronze. Get Bulletin #577 and samples.

THE PALNUT COMPANY
51 Cordier St.,
Irvington 11, N. J.

PALNUT
TRADE MARK
LOCK NUTS
for quick, secure fastening at low cost



STRIP HEATERS installed between conveyor tiers in a fully-automatic gas-fired oven provide more uniformity in shape and color of cookies. Rejects have been greatly reduced

Converted Oven Makes Better Cookies

AL BISS, Industrial Power Engineer
West Penn Power Co, Latrobe, Pa.

The installation of electric strip heaters in a gas-fired cookie oven at the Schaller Baking Co, Greensburg, Pa., has greatly improved the quality of the cookies and reduced rejects.

The oven is fully automatic and requires only one man to load the batter and pack cookies. The cookies are now uniform in shape and the same golden brown all over. The installation has proved so successful that the company is planning to add more electric heaters to replace gas equipment and speed up the baking.

Prior to installing the electric heat, cookies baked in the oven would never come out in the correct shape. In one batch, the edges of the cookies would run out thin and be burned while the center would be too thick. In another batch, the whole cookie would be too thin with uneven edges.

Considerable time was spent in experimenting with various batters and methods of baking cookies in the oven—but nothing seemed to work. Finally it was decided to try electric strip heaters in the oven. Three tiers of strip heaters, totaling 9 kw were installed, four heaters to a tier. This time the cookies were a success.

According to Mr. Schaller, owner and general manager, "We were pretty disgusted with the oven when we first got it. Then we talked to the folks at West Penn and decided to put in the electric elements. Now we're getting cookies that we're proud of and we've cut our rejects way down."

Dial Drying Speeded By Infrared Oven

Drying and baking instrument dials at U. S. Radium Corp, Bloomsburg, Pa., with infrared ovens cuts drying time and allows more frequent parts handling with a minimum of rejects. Many products are painted by hand and require considerable steps and handling. With electric heat, less time is lost between operations and smaller parts can be handled in batch quantities. A 24-kw infrared oven is used for larger parts and three 13-kw and one 16-kw oven for smaller ones. A fourth drying oven (12 kw) was added this summer. Extensive use of small electric ovens and hot plates also is made in laboratory and testing departments. Willard Zimmerman, Industrial Power Representative, Pennsylvania Power & Light Co, Williamsport, Pennsylvania.

(*Industrial Briefs on page* 168)

ONE COMPACT UNIT

for on-the-spot insulating oil purification

Get complete, continuous purification of used transformer and circuit breaker oils—at reduced time, labor and maintenance costs—with HOFFMAN OIL CONDITIONERS.

ONE COMPACT UNIT — consisting of filter and vaporizer provides continuous, automatic reconditioning of used oils to "like new" condition without *down-time.*

Oil is freed of soluble and insoluble impurities. The vaporizer component eliminates volatile impurities such as diluents, air, water, gas . . . insures safe *dielectric strength.*

The cartridge filter component removes organic acids, resins, gums asphaltenes and other oxidation products.

Reduces sludge formation on coils and insulators—faster and more efficient than centrifuge or other conditioning methods.

HOFFMAN OIL CONDITIONERS are designed for central station installation or as mobile, truck-mounted units for field use. Capacities from 25 to 600 g.p.h.

Time, labor, space and cost savings *more than offset* purchase price.

HOFFMAN INDUSTRIAL FILTRATION ENGINEERS will be glad to survey your insulating oil conditioning needs, without obligation.

U. S. HOFFMAN
MACHINERY CORPORATION
INDUSTRIAL FILTRATION DIVISION
255 LAMSON STREET, SYRACUSE 6, N. Y.

U. S. HOFFMAN MACHINERY CORPORATION
INDUSTRIAL FILTRATION DIVISION • 255 Lamson Street, Syracuse, N. Y.

_____ Please send me your Bulletin 974 and Case Study #6
_____ Please have a representative call to survey our needs

NAME _____

COMPANY _____

ADDRESS _____

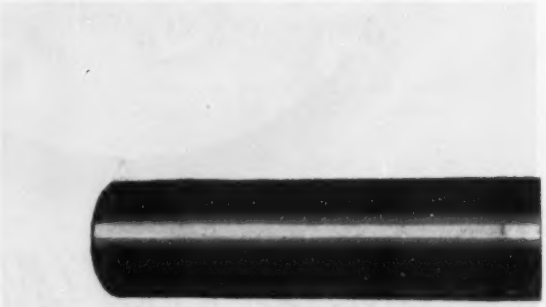
CITY _____ STATE _____

Simplex Control Cables

5 ORANGE 5 ORANGE

WHAT IT IS

Previously, conductors in Control Cables were identified by colored coverings. I.P.C.E.A. recognizes, in its current specifications, that the color name and the color number may be printed on the outside of each individual conductor. Now, unless otherwise specified, all individual conductors in Simplex Control Cables will have a black background with clear white printing.



Conductor identification is provided by printing the color name and the color number on each conductor. This information is printed on two sides of the conductor at 2½″ intervals.

Examples: "7 White-Black," "5 Orange," "3 Red."

Simplex Control Cables with printed color coding are insulated with Simplex-ANHYDREX insulation. This insulation has excellent electrical and physical properties for dependable operation. For additional information about Simplex Control Cables with color coding, write for Folder 1020 to the address below.

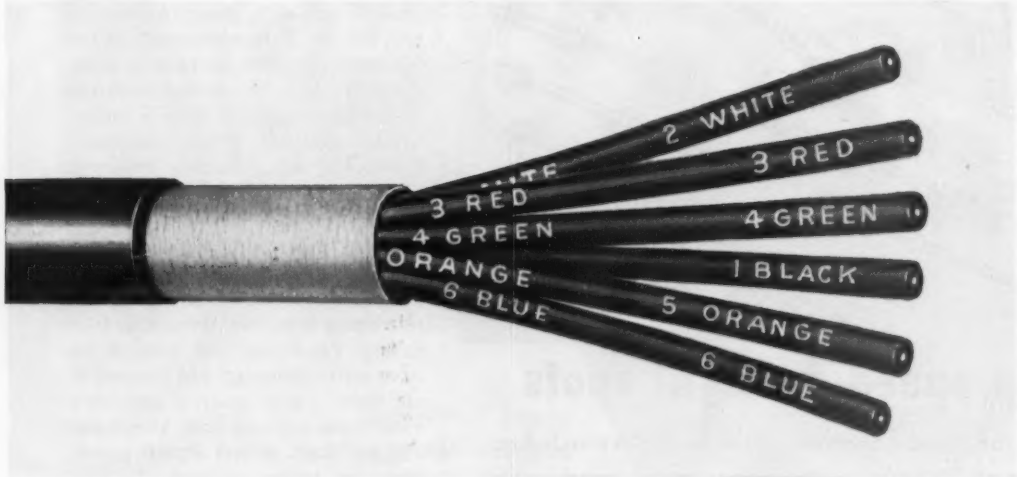
SIMPLEX WIRE & CABLE COMPANY

with PRINTED COLOR CODING

WHAT IT DOES FOR YOU

Printed color coding makes possible faster and more accurate installation, connection and termination of rubber-insulated Simplex Control Cables. It does this by making conductors easier to identify than those with colored coverings.

Colored coverings soil easily and become difficult to recognize. Dirt is



less likely to smudge printed color coding. Because Simplex printed color coding appears on two sides of each conductor, it doesn't have to be twisted to be read.

Colored coverings present the problem of changing hue. Under different kinds of light, color gradations may change. Printed color coding eliminates this difficulty. It also permits using splicing skills of color-blind workmen.

79 Sidney Street, Cambridge 39, Mass.

Slim-fast-versatile Snap-on* Ferret Wrenches

—for top speed in tight spots

Here is one of the most adaptable, time-saving wrench kits you can put in the hands of maintenance or production workers—a complete set of Snap-on's famed Ferret wrenches. The set includes all handles (⅜" square drive), adaptors, extensions and sockets (¼" to ¾"), to speed a wide range of jobs. Handles are long, slim, strong, with patented "Palm-Grip" for real working comfort. 4-way socket grip for quickest handle hook-up. Available through your nearby Snap-on factory branch. Write for Snap-on Industrial catalog and general catalog of 4000 hand and bench tools.

SNAP-ON TOOLS CORPORATION
8108-I 28th Avenue, Kenosha, Wisconsin
*Snap-on is the trademark of Snap-on Tools Corporation.

INDUSTRIAL BRIEFS

Heating sleeves for shrink-fit operation at the Maple Mfg Co, Dearborn, Mich., with 60-cycle induction unit mounted on arbor of hydraulic press eliminates extra handling and allows operator to handle only cold parts. Sleeve is 3½ in. diameter. Inductor coil is designed for 220 v. Company formerly used two electric batch heaters which required two men to operate. Induction unit requires only one operator. E. D. Anderson, Elmer D. Anderson Co, Induction Heating Specialists, Dearborn, Mich.

Drying rubber at rate of 7 ft per min on non-skid bases of 12-ft wide rugs at Dixiana Mills, Laurinburg, N. C., is accomplished in a 30 ft long infrared oven. Over 3,000 lineal feet is the 8-hr average production. The oven has a quick "on" and "off" feature. Production can start in 4 min and cool-off period is short. A uniform heat of 300 F is maintained by the 350 kw in infrared heaters in the oven. Considerable space is saved compared with other ovens and there is no fire hazard. John L. Ponzer, Industrial Power Engineer, Carolina Power & Light Co, Southern Pines, N. C.

Pumping water with 100-kw electric pumps (instead of diesel-operated) is proving cheaper and more efficient at Harrisburg Suburban Water Co, Harrisburg, Pa. Faced with demand for more water, company had planned to use diesel pump to draw additional water from a quarry hole. Diesel was dropped when it was shown pumps could be better automatically controlled with purchased electric power, thus eliminating services of an attendant and lowering costs. Stoner Dietz, Industrial Power Representative, Pennsylvania Power & Light Co, Harrisburg, Pa.

You'll Want to Write for: RLM Standards Institute's 1954 "Standard Specifications for Industrial Lighting Units" containing new data on "upward component" lighting units plus latest approved revisions for RLM's standard specifications. Free copies are available to anyone concerned with buying, selling or specifying industrial lighting. Address: RLM Standards Institute, Suite 818, 328 W. Madison St., Chicago 6.

HERE'S REAL *Versatility* IN OUTDOOR LIGHTING CONTROL

THE FISHER-PIERCE
SERIES 64400 PHOTOELECTRIC CONTROL

This control embodies the proven, dependable F-P basic circuit, in a simple, compact form. Mounting versatility of this unitized control is represented in the adaptions to various manufacturers' luminaires illustrated here, as well as ballast, pole top, cross arm, standard and other mountings.

Versatility of the Series 64400 Control is equalled by its economy. Low initial cost, savings in wiring, labor and materials, as well as low maintenance cost, make it economically practical to use one F-P 64400 Control per lamp.

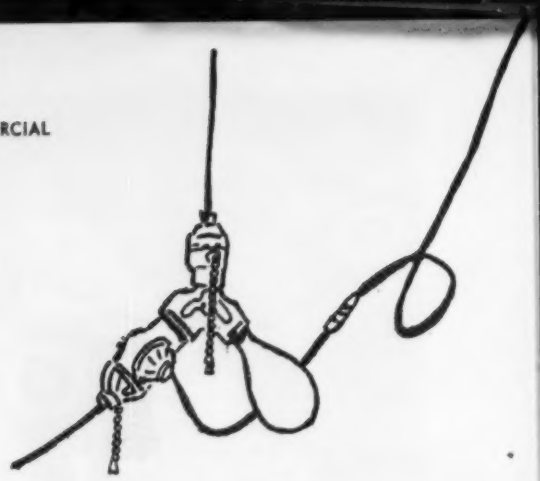
Complete Descriptive Data on Request

THE FISHER-PIERCE CO.,
82 Pearl Street, So. Braintree, Boston 85, Mass.

EXPORT: PHILLIPS EXPORT CORP.
DIVISION OF NORTH AMERICAN PHILLIPS
100 E. 42ND STREET
NEW YORK 17, N. Y.

IN CANADA:
NORTHERN ELECTRIC
CO., Ltd.

Adequate Wiring Finance Plans Pick Up Steam



Connecticut L&P and Alabama Power are latest to adopt pay-as-you-go programs to help customers modernize outmoded home wiring

They're spreading.

First it was Cincinnati Gas & Electric Co. Then other utilities followed suit. Now Connecticut Light & Power Co and Alabama Power Co have announced they too will sponsor pay-as-you-go finance plans to help customers modernize their home wiring.

Much like the original Cincinnati plan (EW, Feb. 22 p 146), the CL&P program allows its residential customers to revamp their wiring, then pay for it in monthly installments with their electric bills. No down payment is required and they have up to 36 months to pay.

Offer applies to residential customers living in houses now wired and using CL&P service. If the customer rents, the wiring agreement must be made with the property owner. Improvements may include any wiring between the company's service entrance and the customer's appliance outlets, including installation of new lighting fixtures. Incidental plumbing required by installation of electric water heaters also can be financed, but not appliances.

Various forms of advertising are telling folks about the plan. They include newspaper ads, display cards, truck signs, bill inserts and handout folders for dealer and contractor use.

Alabama Plan

Alabama Power launched its Residential Wiring Modernization Financing Plan late in July. Like CL&P's, the plan is limited to the home owner. He first selects his contractor and gets a rewiring estimate. Alabama Power, functioning solely as the financing agency, then checks his credit before giving the contractor the go-ahead to do the work.

Customer pays 10% down on the contract price with monthly installments not exceeding 24 months. Maximum amount financed by the company in any one residence is $500, with a minimum of $30. Monthly minimum payment is $5. Plan does not apply to rental properties unless the owner signs the wiring contract and assumes responsibility for the payments; nor does it include residences under construction.

Meetings throughout its service area are helping Alabama Power to explain the plan and enlist cooperation of electrical contractors, distributors, dealers and representatives of electrical manufacturers. Its advertising includes newspapers, direct mail and hand-out material. Company will rely heavily on its home service advisors, dealer and merchandising men, appliance repairmen and other employees to promote the plan.

Wiring Booklet . . . Among promotional materials being used is a 16-page booklet, "What Happens When Wiring Is At Fault," distributed to contractors and customers. With clever use of cartoons, booklet first tells the ills of inadequate wiring and then explains the rewiring plan.

Like other utilities with wiring finance plans, CL&P and Alabama Power hope to uncork overloaded residential wiring systems and ultimately permit a new stream of appliances to flow in. Result: new sales for dealers and bigger electric loads for themselves.

(*More S&S on page* 174)

PP&L Finances Range, Heater Wiring

Pennsylvania Power & Light Co has announced it will finance residential electric range and water heater installation costs through a new "Wire on Time" plan.

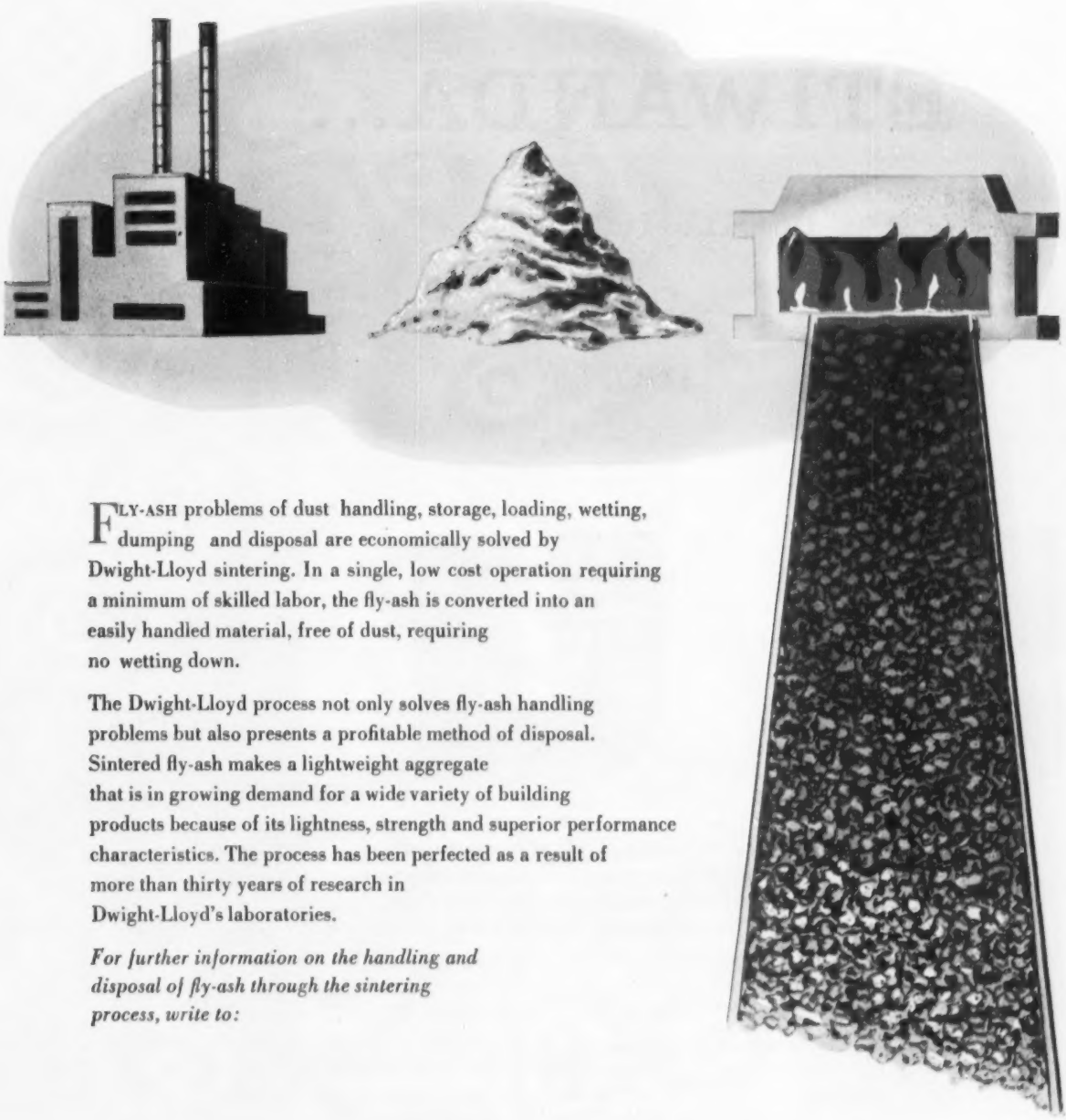
In effect from Sept. 15 through Dec. 31, the plan will finance wiring from the end of PP&L's facilities at the house to the point of appliance connection. It also includes plumbing required for water heater installations.

Plan is intended as an added dealer sales tool and is limited exclusively to electric ranges and water heaters.

Customer first applies for the financing through his dealer. Then, as in the other plans mentioned above, the Power company clears his credit; a contractor does the work and is paid by the company; the customer repays the company in monthly installments. No down payment is required and customers have up to three years to pay. Financing of installation costs are limited between $25 and $150. Minimum monthly payment is $1.

Promotion materials include newspaper advertising, window displays, reference folders and dealer mats plus application and note forms.

An Answer To Your Fly-Ash Handling Problem



FLY-ASH problems of dust handling, storage, loading, wetting, dumping and disposal are economically solved by Dwight-Lloyd sintering. In a single, low cost operation requiring a minimum of skilled labor, the fly-ash is converted into an easily handled material, free of dust, requiring no wetting down.

The Dwight-Lloyd process not only solves fly-ash handling problems but also presents a profitable method of disposal. Sintered fly-ash makes a lightweight aggregate that is in growing demand for a wide variety of building products because of its lightness, strength and superior performance characteristics. The process has been perfected as a result of more than thirty years of research in Dwight-Lloyd's laboratories.

For further information on the handling and disposal of fly-ash through the sintering process, write to:

DWIGHT-LLOYD, Inc.

DIVISION OF SINTERING MACHINERY CORPORATION

119 Sinter Avenue, Netcong, New Jersey

for

ETIWANDA...

Southern California Edison

specified

B U R

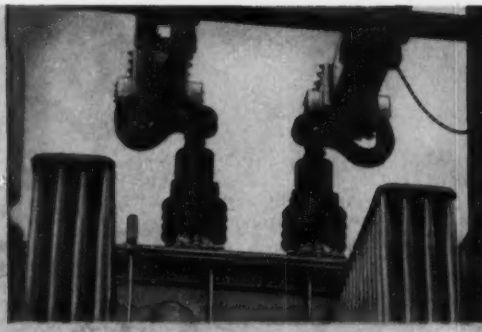
One of the largest ALL-ALUMINUM bus installations in utility history—SoCalEd's new Etiwanda station—uses Burndy connectors *throughout*. Station engineers' confidence in Burndy was logical:

- *Burndy's 11-year aluminum research program, in close cooperation with public utility companies, pioneered major developments in aluminum connectors and procedures.*
- *Burndy's vast experience with substation connector engineering—unmatched in the industry—prepared Burndy engineers for Etiwanda's new and complex requirements.*

Count on Burndy to serve the needs of your most creative engineering.

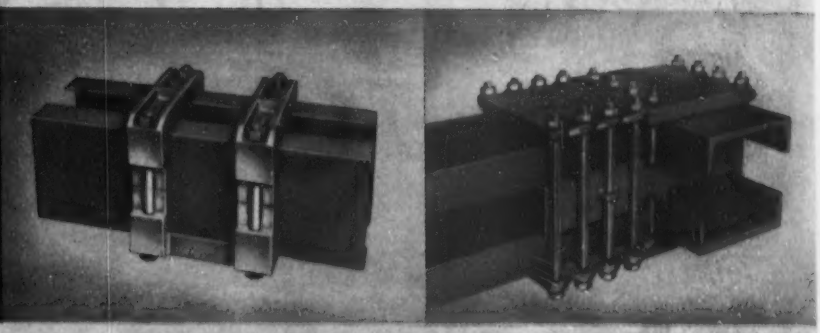
For latest developments in aluminum bus connections see Burndy Catalog AL55. Write or ask our representative to call.

BURNDY — NORWALK, CONNECT. — TORONTO, CANADA



Burndy flexible braid connectors carry the full load current of the transformers from the terminals to the bus system. The flexible design isolates and eliminates the transmittal of vibration that might crack insulators or cause damage to the structure or equipment.

Aluminum channel square bus makes liberal use of Burndy aluminum bus supports, type UH-B-A, which can be seen in the photo. Some slide-fit types are also included where movement of the bus under thermal expansion is to be permitted. Horizontal bus runs are tapped through rugged Burndy NT-B-A Aluminum T-connectors.



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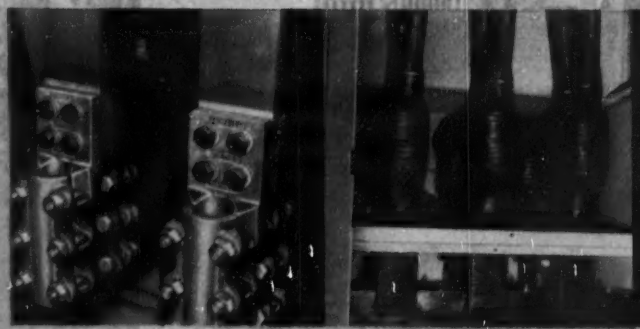


Of critical importance — numerous cable-to-flat bar connections. Burndy specially-designed aluminum NA-G-A terminals; shown before and after installation.

54-3

Factories: NEW YORK, CALIFORNIA, TORONTO · *Export:* PHILIPS EXPORT COMPANY

Look to the Leader

KLEIN

for Quality

HERE'S SAFETY—SERVICE

you can always depend on. For Klein tools and equipment are designed better for your jobs—made of the finest materials—individually tested and inspected. Look for the familiar Klein trade-mark—serving the electrical industry "since 1857."

ASK YOUR SUPPLIER

Foreign Distributors:

International Standard Electric Corp., New York

Write for your free copy of the Klein Pocket Tool Guide Today!

Mathias KLEIN & Sons

Established 1857 Chicago, Ill., U.S.A.

3200 BELMONT AVE CHICAGO 18 ILL

BEFORE—LIGHTING was not up-to-date either in quantity or quality in Jacksonville, Tex.

AFTER—WELL-LIGHTED street with 1.8 footcandles is in sharp contrast to old lighting

Whiteway Lighting on Wood Poles

When Jacksonville, Texas planned whiteway lighting for the community costs were weighed carefully. In order to keep them down the fixtures were installed on hand-picked, 35-foot, pentachlorophenol-treated Southern yellow pine poles. With one coat of knot sealer and one coat of aluminum over the pentachlorophenol treatment these poles made attractive light standards.

The Jacksonville installation consists of 100, 20,000 lumen, mercury vapor lamps on 95-ft. spacings. Mounting height is 30-ft. and light on the street is 1.8 ft-c. Cost per pole installed, including bracket, was $48.53.

Old Courthouse Rewires for Air Conditioning

An old public building in Memphis, Tenn.—originally wired in 1910—today has scores of 1-hp air conditioners in operation.

Installation of 140 of the units was made last spring and summer at Shelby County Courthouse after a rewiring job that cost more than $100,000. It was the biggest of several wire face-liftings for the building since its conversion from gas illumination.

Current in the courthouse' new electric system is controlled by two eight-ft panel vaults. A new generator also has been placed. Tunneling was necessary before wiring and equipment could be installed. Some of the new conduits were placed alongside the original gas pipes.

Air conditioners, themselves, are mounted above head level through holes cut in panels that cover top parts of the windows.

Labels Publicize Rewiring

Cincinnati Gas & Electric Co offers electric dealers adhesive labels publicizing its "Wire on Time" rewiring finance plan which they attach to appliances they display.

(*Continued on page* 183)

Providing maximum service continuity for commercial areas

Service continuity is mighty important on Main Street, U.S.A. Few people are more aware of this than R. F. Lawrence, Westinghouse Distribution Engineer. Bob has helped many utilities design and build distribution systems. On the following pages, he presents some considerations on system design and equipment that can point the way to maximum service continuity.

Secondary networks meet Main Street's exacting power requirements

Today, as we all know, electric power is the lifeblood of Main Street, U.S.A. Main Street needs power—reliable, well-regulated power—to operate efficiently. More importantly, Main Street needs power to grow—to provide air conditioning, high-level lighting, new electrical devices—the modern services that can mean the difference between a thriving or a perishing business community.

This, then, is our joint challenge—and opportunity. How well we meet it will be told in the load growth records of future years.

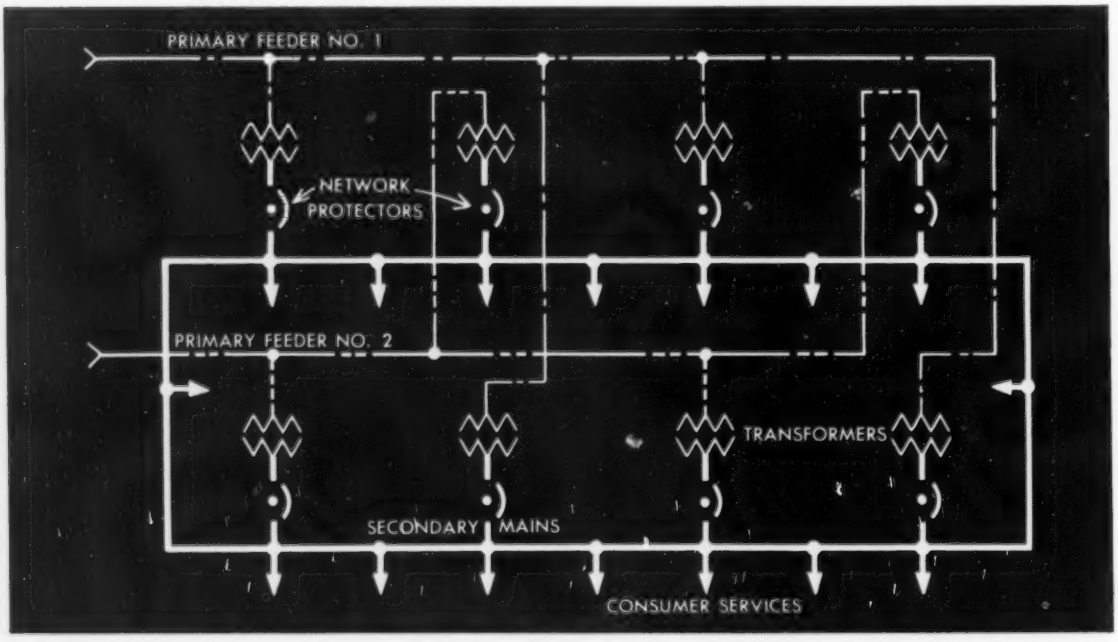
One answer is the use of a-c secondary networks. It's not a new answer, of course, but secondary networks still provide greater service continuity, greater flexibility and permit faster, more economical load expansion than any other distribution system. Further, steady progress in the development of network equipment has opened up several new fields of application for secondary networks.

One of these is the application of both underground and overhead networks to medium-density loads in suburban shopping centers and cities with populations ranging from 25,000 to 100,000. Another—and potentially the most important to you in terms of load revenue and growth—is the application of overhead light-duty networks in smaller cities and towns with populations as low as 5000. All eyes are on Wapakoneta, Ohio, where the first such system is now in operation.

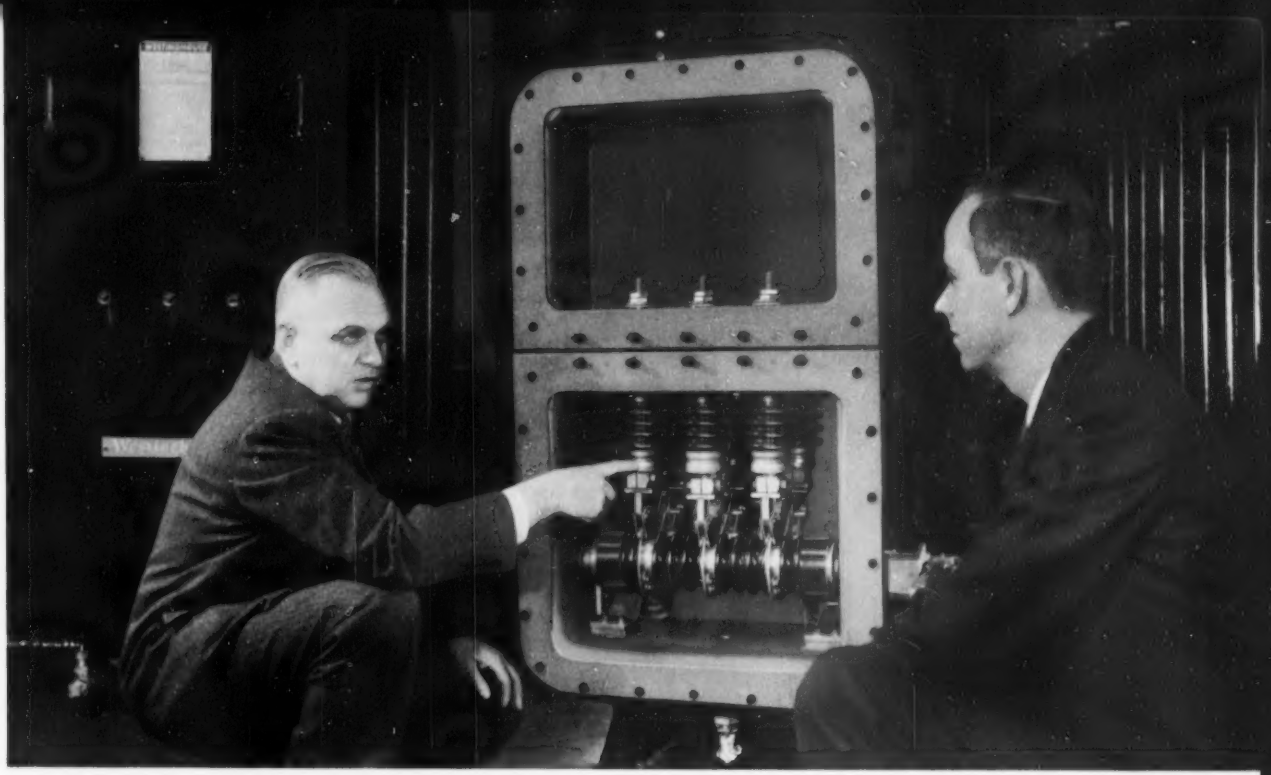
Westinghouse was among the first to recognize the importance of a-c secondary networks in commercial area distribution—an importance that steadily grows with the greater use of electricity. In cooperation with the utility industry, we did much of the basic network system engineering—developed the automatic network protectors and other specialized equipment that made networks possible.

Now, let's see what Westinghouse offers to help solve your commercial area distribution problems. For a starter, let's consider network transformers.

Simplified schematic of a light-duty overhead secondary network system. Use of primary feeders which supply areas other than the commercial area network makes for greater economy.



YOU CAN BE SURE...IF IT'S



Henry Gates, Section Manager, Network Transformer Engineering and Bob Lawrence discuss some of the distinctive features of the new disconnecting and grounding switch.

Top: 1000-kva, ventilated, dry-type network transformer—an ideal type for building installations. **Middle:** Conventional pole-mounted distribution transformer used on light-duty overhead network systems. **Bottom:** 300-kva, submersible, dry-type network transformer.

New primary switch matches reliability of network transformers

The degree of service continuity on the load side of your network system is directly dependent on the reliability of your network transformers. That's why the high quality of Westinghouse network transformers is vitally important to you.

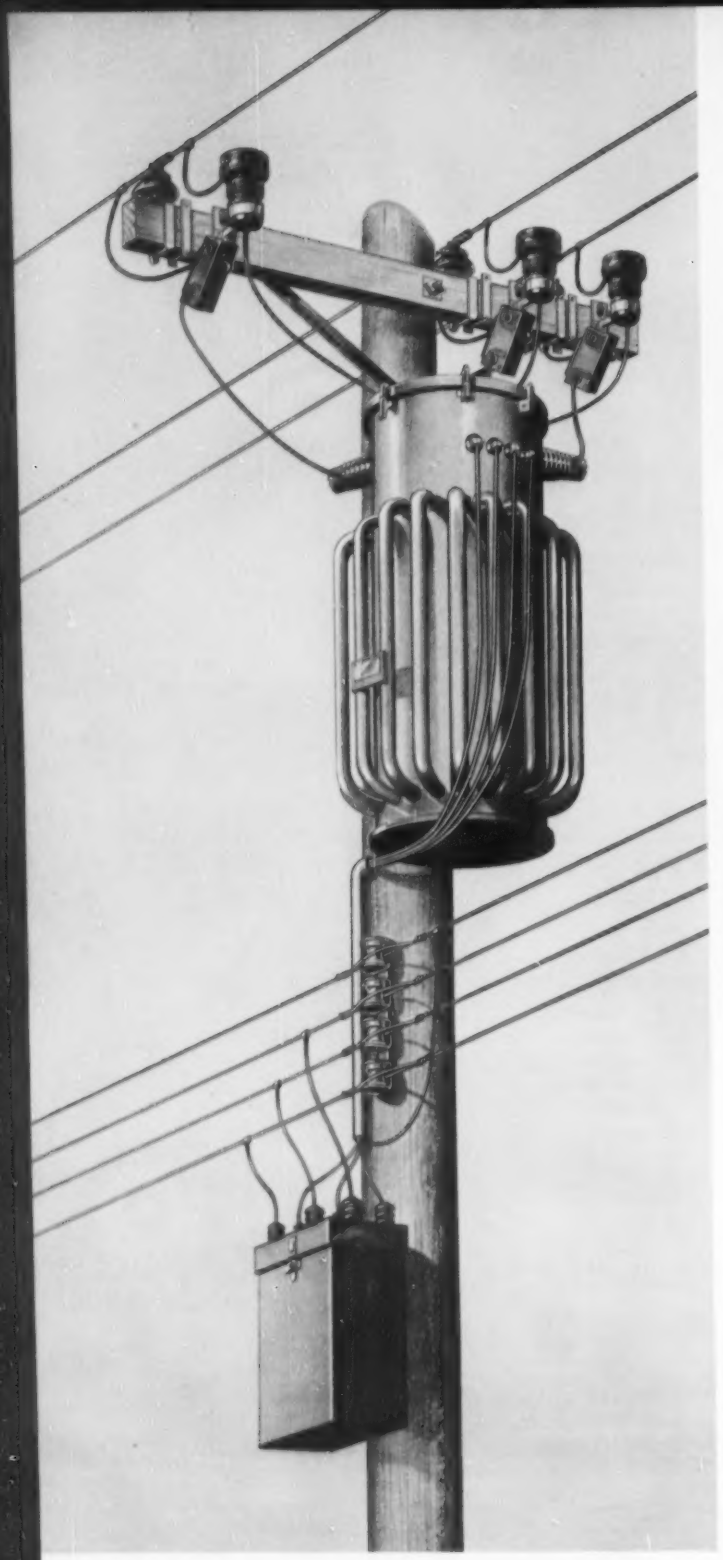
The new high-voltage disconnecting and grounding switch is typical of the extra reliability built into every Westinghouse network transformer. It enables you to isolate any transformer or ground a section of a feeder for maintenance or tying-in a new transformer.

You can count on safe, positive operation of this new Westinghouse primary switch since the contacts are kept perfectly and permanently aligned. This is accomplished by new and exclusive Westinghouse methods of positioning both stationary and rotating contacts to match perfectly at all times. As a plus feature, all contact bushing hardware is rolled on to assure a perfect seal between terminal and switching compartments.

Westinghouse network transformers are constructed with Hipersil® cores and continuous wound

(Continued on next page)

Westinghouse



Typical light-duty overhead network installation—CM-88 network protector mounted on a pole below a distribution transformer. Note the neat appearance of this installation.

(Continued from preceding page)

coils. This provides a smaller and more rugged core-coil assembly with optimum iron-to-copper-loss ratio required by the network system.

Westinghouse offers four basic types of transformers for use on secondary networks: (1) the submersible dry-type network transformer, with all the advantages of dry-type construction, suitable for locations subject to flooding; (2) the ventilated dry-type network transformer, offering maximum safety for dry locations without requiring vault construction; (3) the standard liquid-filled (oil or Inerteen®) network transformer, which is available in vault type for occasional submersion and subway type for periodic submersion; and (4) the conventional pole-mounted distribution transformer, for use on the light-duty overhead network system. The first three network transformers generally use transformer-mounted protectors; the light-duty network uses separately mounted protectors.

Relay design . . . vital to network protector performance

The focal point of any a-c secondary network system is the relay that controls the automatic network protector. Thus, the design and performance of this relay is a matter of vital concern to you.

Westinghouse network protectors use a three-phase induction-type relay—the CN-33—that's superior in every detail of its design. Gearing has been eliminated—and with it a potential source of trouble. Knife-edge bearings on the drum shaft prevent dirt accumulation—minimize wear. Permanent magnets prevent contact bouncing. Terminals are front-accessible—terminal screws can be used as test switches, greatly facilitating testing and adjusting the relay when mounted on the protector. The relay can be removed and remounted with no danger of improper connection. This compact, dependable relay is used on *all* Westinghouse network protectors.

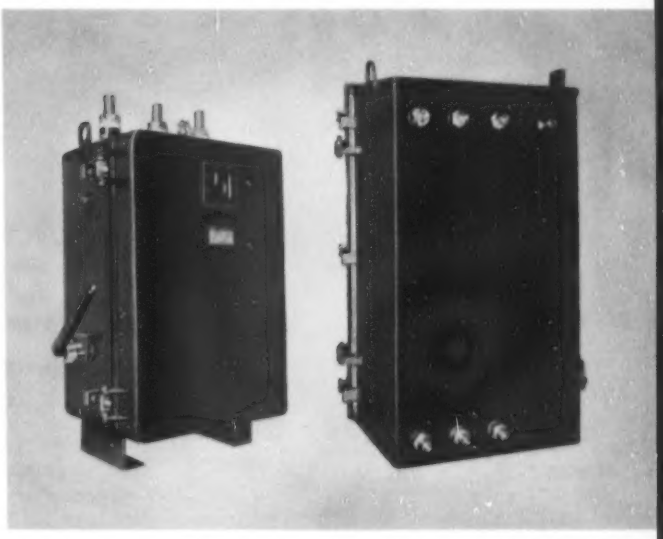
Westinghouse protectors save on operating costs, too. Thanks to De-ion® arc chambers that extend contact life and the sturdy relays, maintenance is required only about once every two years. Relay settings are the only adjustments needed. Quick-

Gene Miller, Network Protector Sales Engineer (right), with Hank Lokay and Bob Lawrence of Utility Engineering look over a 75-kva CM-88 light-duty network protector. Gene is pointing out the 3-phase master relay used in all Westinghouse network protectors.

opening housings, captive hardware and exclusive dual-motion hinge assure fast accessibility.

Westinghouse offers you three classes of network protectors which cover every distribution need: the CM-22 heavy-duty protector in either a submersible or a ventilated housing; the CM-44 medium-duty unit in either a submersible, ventilated or weatherproof housing; and the new, exclusive CM-88 light-duty unit in weatherproof housing for overhead network service.

Another important factor affecting network service continuity is overloading. Westinghouse can help you lick this—economically—with the new secondary network capacitor, which is discussed on the following page.



Left: 1600-ampere, vault-type CM-22 network protector. **Right:** 600-ampere, weatherproof CM-44 network protector.

Westinghouse

New network capacitor reduces overloading, improves continuity

A constant threat to service continuity in commercial areas is overloading of network conductors and apparatus caused by rapid load growth. Heavy additions of air conditioning and wider use of electrical conveniences have made overloading a problem on many networks.

Now, Westinghouse has developed a secondary network capacitor that will help you meet this threat—more quickly and at less cost than adding cable or transformers. This is a compact, 13⅓-kvar, 216-volt unit that meets all the severe requirements of underground operation.

A new terminal-mounted, current-limiting type fuse renders the fuse operation virtually independent of the fault current capacity of the system, thus fully protecting the capacitor from high fault currents and avoiding service shutdowns. The design of the fuse enables it to be sealed—along with the terminal connection — in a watertight Neoprene sleeve, thus permitting submersible operation of the complete assembly.

The network capacitor is specially designed to operate in 55°C ambient temperatures, compared with 40 to 50°C for conventional units. For corrosion protection, the steel case is sprayed with molten zinc to a depth of 8 mils, which is then permeated with an organic finish. So protected, it has a life expectancy of 10 years fully immersed, or 25 years in a dry vault—*without maintenance.*

Due to their compactness, Westinghouse network capacitors require only 60% as much vault space per kvar as other available units. They may be obtained in single units or factory-assembled and wired in galvanized racks that will clear a 30″ manhole. Mounting arrangements are completely flexible.

W. H. Smee, Underground Foreman, Alabama Power Company, points out some of the advantages of this Westinghouse network capacitor installation in downtown Mobile. It's highly accessible—takes up little room—operates completely submerged—a necessity in this location. This factory-assembled and wired capacitor equipment, rated 120 kvar, is installed in conjunction with a Westinghouse 500-kva network transformer.

YOU CAN BE **SURE**...IF IT'S

Here, Guy Metzler, Manager of Unit Equipment, discusses a model of a double-bus spot network situation.

Continuity starts with reliable power supply

For completely reliable power distribution in commercial areas, you've got to consider the link in the chain ahead of the secondary network system—the source of power supply.

If you use distribution substations to feed network primaries, your best choice for maximum service continuity is a Westinghouse unit substation arranged in either double-bus or single-bus spot networks. DH air circuit breakers have fast, safe De-ion arc extinction; drawout for easy inspection; are completely interchangeable for quick replacement. The transformers add good regulation to service continuity through automatic tap changing under load.

By locating Westinghouse unit subs close to the center of your network load, you'll save on copper, get better regulation and reduce power losses. And you'll make it easy to expand or split your networks with these attractive, compact substations. To add a feeder, all you have to do is add the compact switchgear unit. The substation can be moved simply and inexpensively.

4000-kva spot network substation with in-line single bus.

An important consideration for future network system design is heavily concentrated electrical loads. Westinghouse engineers have studied this—and propose a practical solution on the next page.

Westinghouse

Westinghouse studies indicate higher network voltages for concentrated load areas

Since 1922, Westinghouse has pioneered the development of 120/208-volt secondary networks for both underground and overhead systems. But, in recent years, the increasing concentration of electrical loads in downtown areas and, particularly, in large commercial buildings has raised this question: Is the use of higher network voltages in such areas desirable—and economically practical?

The answer is emphatically yes! Recent studies by Westinghouse of the basic principles involved show that 265/460-volt secondary networks for high load concentrations offer important advantages to both utilities and power users. To the utility, substantial economies are indicated through the use of higher rated equipment, which means lower cost per kva and more efficient transport of power at the higher voltage. For the user, there are definite cost advantages in higher voltage distribution systems and in direct feeding of large motors for air conditioning and 265-volt fluorescent lighting.

Studies like this indicate the continuing leadership of Westinghouse in commercial area distribution. We are constantly striving to improve both equipment and methods of distributing power . . . to the end of helping you serve your customers better. Why not use our experience to help you plan for maximum service continuity in your commercial areas? You can start the ball rolling by calling your nearby Westinghouse representative. CP-1019

YOU CAN BE **SURE**...IF IT'S **Westinghouse**

For detailed information on Westinghouse network equipment, call your Westinghouse representative. Or fill in this coupon and mail to Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

Gentlemen: Please send literature checked below.

- ☐ Network Transformers . . . . . **DB 48-600. D, L, SD**
- ☐ Network Protectors **CM-22** **DB-35-550**
- ☐ **CM-44** **DD-35-600**
- ☐ **CM-88** **B-3977**
- ☐ Network Capacitors **DB-49-330**
- ☐ Unit Substations **B-4061**

Name_____

Title_____

Company_____

Street_____

City_____ State_____

CP-1019

S & S Shorts

Lamp Winners Named

As their recognition for combining decorative beauty, correct lighting and value in their products, 22 lamp manufacturers have been given Decorator Achievement Awards in contest sponsored by General Electric Co's Lamp Division. Award winners are: Abels, Wasserberg & Co; Art Lamp Corp; Artistic Lamp Mfg. Co; Aurora Lamp Co; Bradley Mfg. Co; Calpa Products Co; Colonial Premier Co; Daison Mfg. Corp; Dunhill Mfg. Dist. Corp; Fashion Lamp Co; Paul Hanson Co; Lulis Co, Inc; Marbro Lamp Co; Mario Mfg. Co; National Lighting Equipment Co; L. Rosenfeld & Co; Royal Haeger Lamp Co; Stadler-Neuwirth, Inc; The Stiffel Co; William Tolen & Son, Inc; Wilmer Co; Verplex Co.

Underground Lights Up

"Even the dirt looks clean," one person told the New York Times last month after new fluorescent lamps were turned on over New York subway platform in Grand Central station. Illumination jumped from 0.6 ft-c to 8 ft-c when switch was turned. New system consists of 6-ft fixtures mounted in continuous lines for entire length of subway station. More are planned in other locations to replace present lamps.

"Selling Bee" Delivers

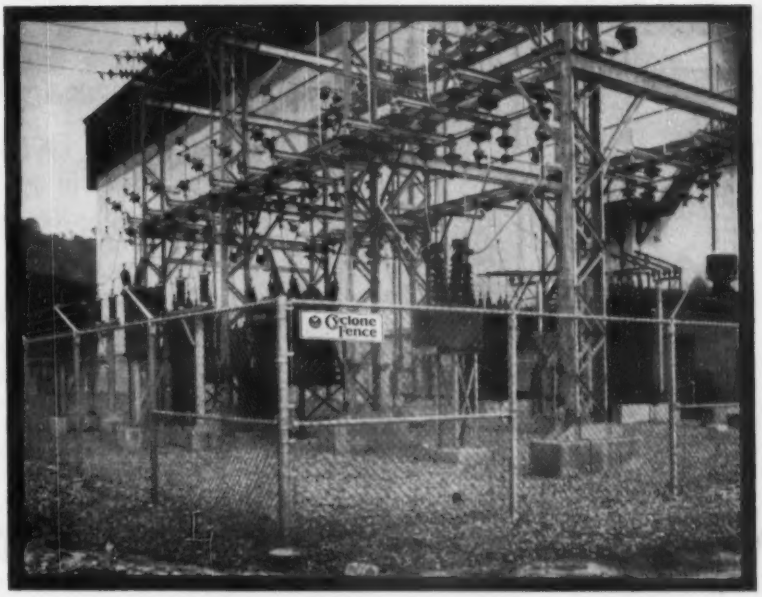
Alabama Power Co sold 2,580 major electric appliances against a quota of 1,800 in a 90-day "Selling Bee" sales campaign just closed. Of the 87 cities and towns participating, all but eight made 100% or better of their assigned quotas.

Planning Pays

Planned residential lighting activities at New Orleans Public Service Co has helped its Residential Division to increase lighting load by 2,156 kw since the first of the year. This is a 130% increase over the 936 kw added in same period last year.

Fryer-Cooker Recipes Ready

"Electric Fryer-Cooker Recipes," said to be the first and only cook book for Mrs. Housewife's newest electric cooking wonder, is now available at bookstores.



Powerful Protection for Power Plants

...CYCLONE FENCE!

WHEN installed around municipal power plants and substations, Cyclone Fence proves its unsurpassed protective ability in two ways. First, it protects the important plant, the valuable equipment and vital services from damage and interruption by vandals and saboteurs. Secondly, it guards mischievous children and careless adults from the possible dangers of their own thoughtless trespassing.

If you are responsible for enclosing a power station you can't be too careful when it comes to selecting a fence. Only the best is good enough for such an important project. Which is why many electric plant authorities specify Cyclone Fence.

You *can* buy cheaper fence than Cyclone, but it will cost you more in the long run. Cyclone gives full value for your dollar. Nothing but brand-new, top-quality material is used throughout. The chain link fabric is woven from heavy steel wire and galvanized *after* weaving for greatest resistance to rust. Erection is handled by full-time, well-trained experts. Cyclone engineers will be glad to give you more information on your particular fencing problems.

NO JOB IS TOO LARGE—NO JOB IS TOO SMALL FOR CYCLONE*

CYCLONE FENCE DEPARTMENT, AMERICAN STEEL & WIRE DIVISION
UNITED STATES STEEL CORPORATION
WAUKEGAN, ILLINOIS · SALES OFFICES COAST TO COAST · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

Cyclone Fence, Dept. V-94, Waukegan, Ill.

Please send me without obligation, complete information on Cyclone Fence and Gates.

Name .....

Address .....

City ..... State .....

Cyclone is the trade-mark name of fence made only by Cyclone. Accept no substitute.

USS CYCLONE FENCE

UNITED STATES STEEL

MANUFACTURERS AND MARKETS

Alabama Power Installs . . .

. . . Factory-assembled secondary capacitor bank in network vault to relieve ampere loading on feeders and transformer

New factory-assembled secondary network capacitor equipment was recently installed by Alabama Power Co at Mobile, Ala. Claimed to be the first of its kind, the vault installation relieves ampere loading on primary feeders and network transformer, allowing a greater paying kw-load.

The installation shown provides a total of 120 kvar, 3-phase, at 216 v. The capacitor assembly was supplied by the Westinghouse Electric Corp ready for mounting directly on the wall of the network vault. Since the vaults are occasionally flooded, this equipment is completely submersible. Each capacitor is protected by a terminal-mounted current limiting fuse under the waterproof neoprene boot, and the cases are heavily metallized with zinc to prevent rust.

HV Motor Starter . . .

. . . Introduced by EC&M has 50,000-kva air-break interrupting capacity

Electric Controller & Manufacturing Co, Cleveland, will shortly introduce an air-break motor starter of 50,000-kva interrupting capacity. The device, the culmination of eight years of research, is described as the first to function without fuses or oil dampening vat to control arc on 2,200 to 5,000-v motors.

The motor starter will be shown at the Iron and Steel Exposition in Cleveland, Sept. 28-Oct. 1. The device has been tested and approved in the laboratories of Crompton-Parkinson, Ltd, of England.

The air-break device employs three arc chutes containing closely set Mycalex baffles to dissipate arc energy. It also contains blowout coils for automatic blow off. The coils function with laminated iron ears to cause the arc to blow upward into the arc chutes.

In operation, current to start the motor passes through a disconnect switch to air-core current-limiting reactors, to overload relays, and then through a contactor to the motor. If there is a fault, the overload relays cause the contactor to interrupt the circuit.

Two other styles of starters in this line are (1) with power fuses for systems of 150,000 kva (2,300 v) and 250,000 kva (4,600 v) availability, and (2) a Valimitor style with air-core reactors to limit infinite kva to a value within the starter rating.

B&W Expands Capacity

Babcock & Wilcox Co has recently completed a 4-yr expansion program to meet the increasing demand for alloy-steel tubing. According to Edward A. Livingston, vice president in charge of the Tubular Products Div, B&W's steel-making facilities have been more than doubled to a capacity of 230,000 ingot tons per year.

Livingston said that at the present rate of increase the industry annual shipments of alloy-steel tubing should reach 1 million tons by 1960. Statistics of the American Iron & Steel Institute give annual shipments in tons by the entire alloy-steel tubing industry as shown in the table.

1946	276,217
1948	415,758
1950	458,267
1952	459,669
1953	576,068

B&W has added a 75-ton and a 50-ton arc furnace, making a total of four now in service. Two new soaking pits were included in the program. A 1,500-ton forging press was installed, bringing forging capacity to 120,000 tons per year.

Sylvania Expands in West

Garlan Morse, Pacific Coast Director of Sales for Sylvania Electric Products Inc, predicted that the eight western states will be consuming 200 million light bulbs a year by 1960. Speaking at the company's regional conference at Carmel, Calif., Morse cited Sylvania's establishment in California of three factories and laboratories in two years as recognition of the importance of the western market.

Sylvania plans to establish a new warehouse at Vail Field, Los Angeles.

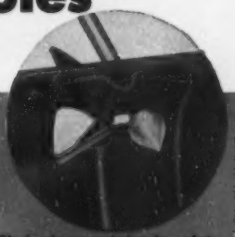
Wire Symposium

Third Annual Wire and Cable Symposium will be held December 7-9, 1954 at the Berkeley Carteret Hotel, Asbury Park, N. J. Sponsored jointly by the Signal Corps Engineering Laboratories, Fort Monmouth and the wire and cable industry, it will cover wire and cable materials, their characteristics and uses, and constructions, together with manufacturing and equipment problems, field construction methods, and uses in systems operation.

(*More M&M on page* 187)

Give the Guy a CHANCE

the NEVER-CREEP pulls against undisturbed earth in machine or hand-bored holes



Circle shows reinforcing plate and rod socket.

The Never-Creep is formed of high strength structural steel, reinforced in area of greatest pull with a high carbon steel core plate.

Once in, they're in to stay!

Pull test after pull test—made for power companies all over the country—show the same result: "Test stopped without failure. There was no damage to the anchor."

And the test of time proves that thousands of Never-Creeps installed for years and years hold more "over the long pull" than any other type of anchor.

Chance Never-Creep Anchors can be installed in holes drilled at an angle by your hole boring equipment. The size of the hole makes no difference in the holding power of the Never-Creep—it pulls entirely against solid undisturbed earth, and is practically unaffected by moisture seepage.

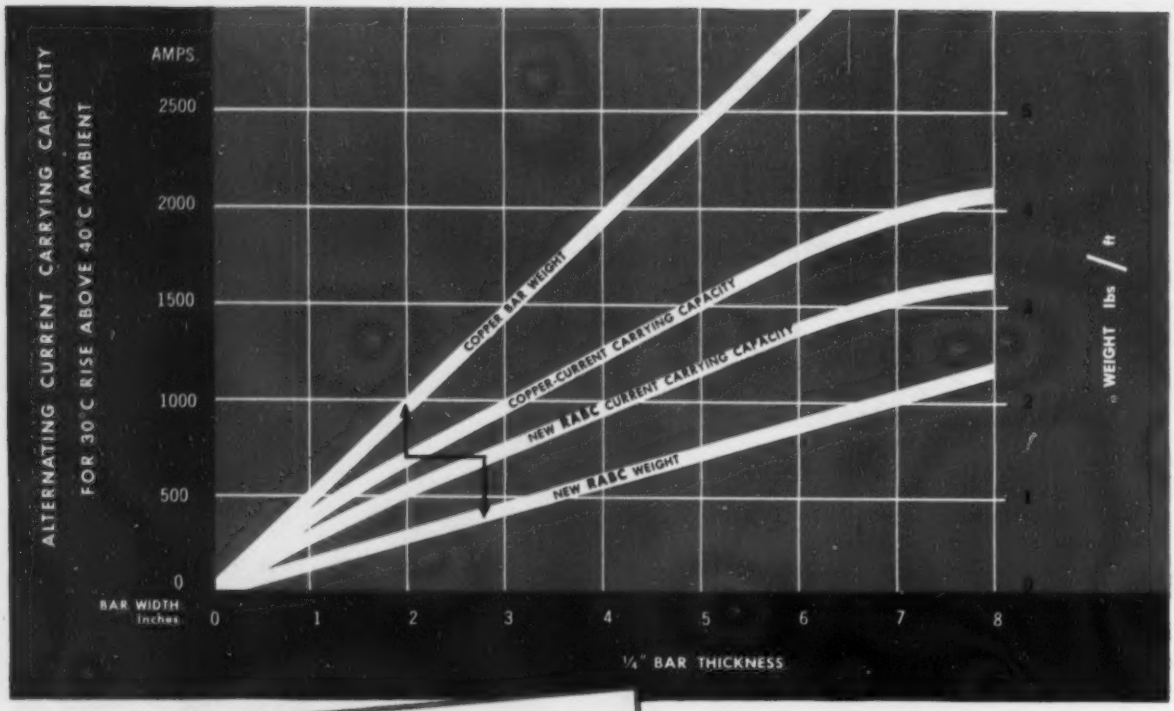
Protect your investment in line construction by specifying Chance Anchors for your guys. The Chance Distributor in your area can probably fill your order from stock. *Specify Chance for Service!*

ABC INDUSTRIES

A·B·CHANCE CO·

CENTRALIA, MISSOURI
SAN FRANCISCO, CALIFORNIA

ANCHORS • GUYING FIXTURES • LINE CONSTRUCTION TOOLS • CONDUCTOR CLAMPS
GROUNDING EQUIPMENT • HOT LINE TOOLS • HIGH VOLTAGE SWITCHES • CUTOUTS



GRAPH SHOWS current and weight characteristics of both copper and new **RABC.** For example, a current load of 700 amperes requires a 2" x ¼" copper bar weighing just under 2 pounds per foot, compared to an **RABC** aluminum bar 2.8" x ¼" weighing 4/5 pounds per foot. Thus size is increased only a little more than 1/3 and weight is decreased 60%.

Announcing a new...

Reynolds Aluminum for Bus Conductor

FEATURING:

- **Optimum Strength *(29,000 psi tensile*)***
- **High Conductivity**
- **Versatility in Size and Shape**
- **Low Cost**

A new Reynolds Aluminum development especially for bus conductor applications provides greater strength with very little effect on electrical conductivity. In addition, because of the unlimited range of sizes and shapes in which **RABC** (Reynolds Aluminum Bus Conductor) is available, you can now design to the minimum amount of metal that is needed for current carrying jobs. All at a cost as low as or lower than for any previous aluminum bus conductor.

Naturally, the past advantages of aluminum bus conductor still hold true. More conductivity per dollar. Long range availability. Excellent resistance to corrosion. And, lighter weight which permits faster, easier handling and saves on erection time and labor costs. Write for more information.

Call on Reynolds Engineering Service for help on your electrical problems. Reynolds engineers will conduct meetings with your men and provide them with the latest information on all electrical applications of aluminum. Also write for a complete index of design and fabrication literature. *Reynolds Metals Company, 2584 South Third Street, Louisville 1, Ky.*

**guaranteed minimum*

See "Mister Peepers", starring Wally Cox, Sunday nights on NBC-TV

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

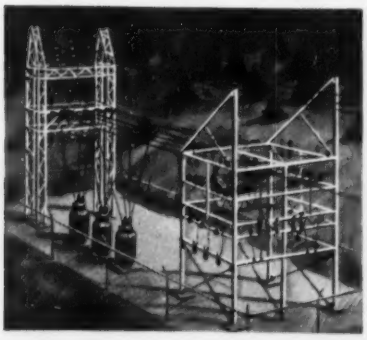
(Advertisement)

Electrical Applications of Aluminum

Aluminum Cable Steel Reinforced

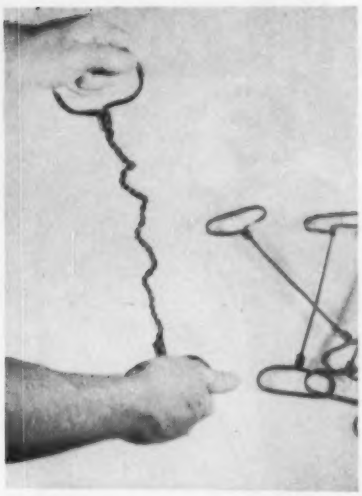
Worthwhile savings are yours with Reynolds ACSR because the initial price of this steel reinforced aluminum cable is less, and because you save through reduced handling and field costs. Men and equipment handle 20% less weight so stringing is easier and faster. Reynolds ACSR is light yet strong—you can go to longer distances between poles—save up to four poles per mile. Or, because there is less sag, you can use shorter poles or towers. Write for the free ACSR manual on line design and erection... sag-tension charts, staking tables, stringing-sag tables, etc. Please request on your business letterhead.

Savings in Substations



Important savings in erection costs and maintenance are prime reasons for the growing popularity of aluminum substations with utilities and large industrial users. The light weight and easy fabrication of aluminum permits faster, simpler erection. More shop assembled aluminum components mean less assembly at the job site—less skill is needed in assembly and anywhere from 3 to 7 days can be cut in erecting an average substation. Maintenance costs are kept to a minimum because aluminum requires no painting—no costly shut-downs.

Contact your nearest Reynolds Branch Office or write to Reynolds Metals Company at the address on the opposite page for details on the subjects above and also for details on the many other applications of aluminum in the electrical field.



FILM INSULATION adheres to rectangular wire even when twisted, GE claims

General Electric Using Rectangular Formex

General Electric Co is currently using Formex insulated rectangular copper wire on 3 to 15-kva transformers, 15,000 v and below, and on 25 kva units below 6,000 v. Use of rectangular Formex wire is to be extended to other ratings as soon as new manufacturing facilities can be installed.

A new method of coating rectangular wire with film insulation makes possible several transformer improvements. For example, use of Formex wire together with improved silicon core steels in a 15-kva, 7,200-v transformer resulted in reducing weight from 360 to 325 lb, and the diam from 16 to 14 in.

With this new method the insulation is reportedly spread evenly on the edges as well as on the flat surfaces of the conductor. The wire is given 5 to 8 separate coats of Formex wire film, each of which is baked. GE tests demonstrate that 3 mils of Formex film has a higher insulation strength than wire covered with 5 to 7 mils of paper or paper-and-cotton insulation.

Delta-Star Additions

Delta-Star Electric Division, H. K. Porter Co, Inc. Pittsburgh, has completed a $250,000 expansion program. It includes 15,000 sq ft additional assembly space, modernization of structural steel fabricating plant, and installation of new automatic fabricating equipment. The plant now covers about 175,000 sq ft and employs over 700 people.

Dalles Bids Awarded

The Dalles Dam on the Columbia River will have 4,500 hp hydraulic turbines supplied by Pelton Waterwheel Co, San Francisco, for $197,-714. The Woodward Governor Co, Rockford, Ill., will supply governors for $54,500. The Corps of Engineers passed over bids of three foreign companies in awarding the contracts to domestic firms. Establishment Neyrpic of France had bid a low $173,573 for both turbines and governors. The equipments are for two station service units.

MANUFACTURING BRIEFS

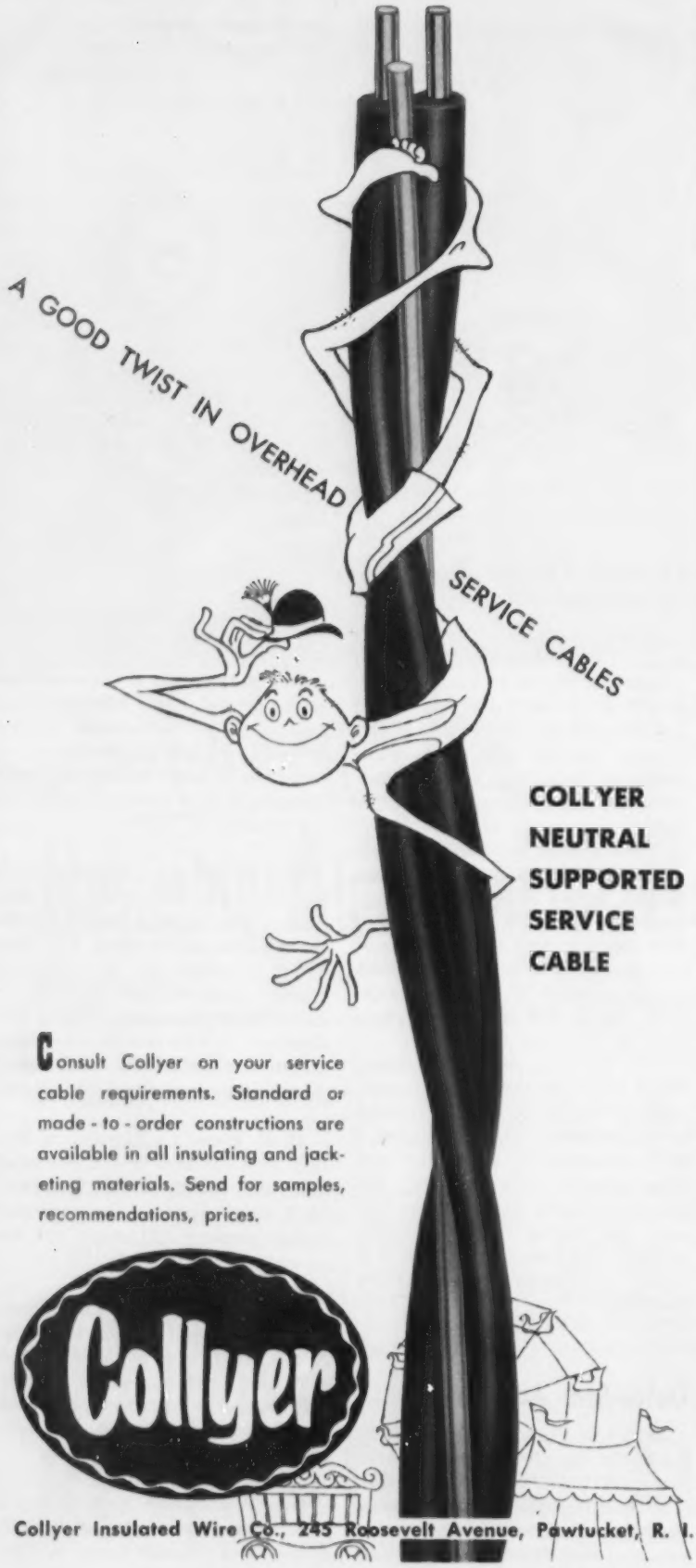
Kaiser Aluminum & Chemical Corp next year will begin building a new rolling mill at Ravenswood, W. Va. Scheduled to go into production in mid-1956, annual capacity will reach 250-million lb of aluminum sheet and foil products.

Dow Chemical Co, Midland, Mich. has begun construction of new, ultramodern laboratories to increase facilities for research on wood. The 208x 190-ft structure, to be completed within a year, will give space for the Biochemical Research Dept. Biochemical sections include toxicology, industrial hygiene, basic biochemical, microbiology, and wood laboratories.

H. K. Porter Co has sold its Buffalo Steel Division to the Rochester Iron and Metal Co of Rochester, N. Y. for $2,600,000. The plant near Buffalo employs 400 people and has an annual capacity of 70,000 ton.

Cooper Alloy Foundry Co, Hillside, N. J., has changed its name to Cooper Alloy Corp. Cooper produces stainless steel cast products, valves, fittings, and accessories and does production machining of stainless steel components.

Four Wheel Drive Auto Co has a new chairman of the board, Ben W. Heineman of Chicago. Robert A. Olen


A GOOD TWIST IN OVERHEAD SERVICE CABLES
COLLYER NEUTRAL SUPPORTED SERVICE CABLE
Consult Collyer on your service cable requirements. Standard or made-to-order constructions are available in all insulating and jacketing materials. Send for samples, recommendations, prices.
Collyer
Collyer Insulated Wire Co., 245 Roosevelt Avenue, Pawtucket, R. I.

and Arthur S. Bowes were elected directors. These three, with Franklin Lyons, member of the executive committee, are said to own over half of the capital stock.

National Vulcanized Fibre Co of Wilmington, Del. has merged the fibre specialty and phenolite divisions, located in Kennett Square, Pa, and to be known as the Kennett Plant.

Rome Cable Corp has borrowed $4-million on 15-yr serial notes from institutions to take care of its expansion program and the refunding of $1,568,000 of old long term debt.

Minnesota Mining & Manufacturing Co has begun patent infringement suits against 13 firms and 6 individuals, charging illegal manufacture and sale of its Scotch brand electrical tape No. 33 (U. S. patent reissue No. 23,843).

Line Material Co of Milwaukee is aluminum metallizing its capacitor tanks to prevent corrosion. The new process consists of cleaning and roughening mild steel tanks, applying aluminum spray, following with a chromate primer, and ending with a dark alkyd resin enamel.

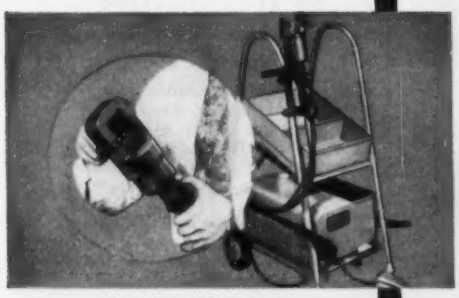
Electrical parts and equipment placed third among the cargo items carried by United Air Lines during the first 8 months of 1954. By total weight flown, electrical equipment was outranked by (1) machines and machine parts and by (2) cut flowers. Suppliers are believed to rely on air transportation to enable maintenance of lower inventories.

Labor . . . Rome Cable Corp production employees in an NLRB election rejected the International Association of Machinists (AFL) by a vote of 557 to 116. This result at Rome, N. Y., follows similar action last April in the company's Torance, Calif., plant.

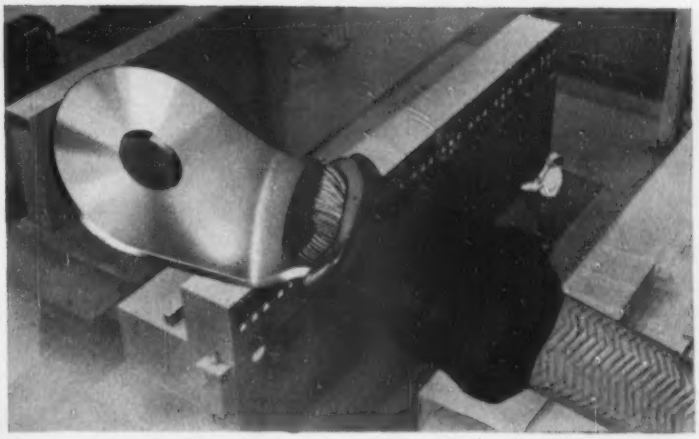
General Electric Co's offer of a 4 to 8¢ hourly wage boost for 100,000 production workers was accepted by IUE-CIO. This 2.68% raise is retroactive to Aug. 2.

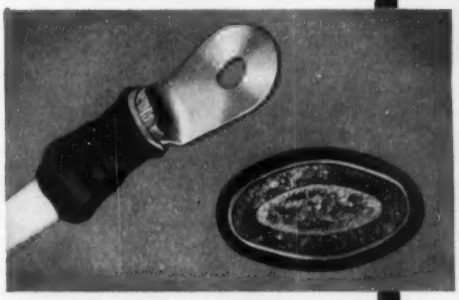
Cornell-Dubilier Electric Corp is expected to raise employment at its Sanford, N. C., plant from 650 to over 900 by the first of the year.

AMP FIRST IN SWITCHGEAR!

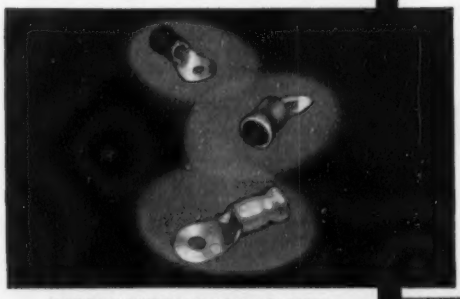


NEW DYNA-CRIMP TOOL
New, powerful, DYNA-CRIMP tool features fast positive crimping action and easily-opened swivel head. Crimping heads can be changed easily. A-MP DYNA-CRIMP tool gives maximum portability with remote control operation. Interchangeable dies are available for use with A-MP's complete line of Aluminum and Flag terminals. Shown above with moveable cart to transport power unit providing maximum flexibility for Bench-Production line use.





BONDING FEATURE MOST IMPORTANT
Bonded insulation is the most important factor *in producing a successful insulated terminal.* The positive and complete bond of the insulation to the terminal sleeve insures uniform insulation thickness under crimping pressures, and therefore transmits this pressure evenly to the center of the crimp area. With this precision-engineered A-MP crimp and BONDED insulation you can be sure of maintaining proper dielectric and tensile values in the finished connection. More intimate contact achieved by confining, over a greater area, terminal and wire under intense crimping pressure.



OTHER IMPORTANT A-MP "FIRSTS"
Completely separate metallic reinforcing ring grips wire insulation, prevents exposure of conductor during sharp bends, cable fatigue caused by flexing and vibration and forms a barrier to foreign objects coming in contact with current carrying members. New helical tongue design gives maximum strength with minimum weight.

SIZES 8 THROUGH 4/0

Ampli-Bond Trade-Mark

THE ONLY LARGE SIZE TERMINAL WITH BONDED INSULATION!

WITH INSULATION SUPPORT AND SUPERIOR A-MP CONFINED CRIMP.

10 distinctive and distinguishable features make precision-engineered AMPLI-BOND terminals the best quality insulated termination for copper wire.

- INSULATION WITHSTANDS A MINIMUM OF 6000 VOLTS!
- INNER COPPER SLEEVE FOR STRENGTH AND VIBRATION RESISTANCE
- FULLY INSULATED METALLIC REINFORCING RING GRIPS INSULATION
- COLOR CODED FOR RAPID IDENTIFICATION
- BRAZED BARREL SEAM
- SUPERIOR A-MP CONFINED CRIMP
- INNER BARREL DIMPLED FOR INCREASED TENSILE STRENGTH
- COPPER TERMINAL BODY ELECTRO-TINNED FOR HIGH CONDUCTIVITY
- BONDED INSULATION
- PROOFMARK FOR POSITIVE IDENTIFICATION

Here is a large size terminal that presents to the users of heavy duty wire the same quality connection that has made A-MP famous for PRE-INSULATED type terminals throughout the industry. Write today for information about AMPLI-BOND and new powerful AMP DYNA-CRIMP portable pneumatic-hydraulic crimping tool.

AMP Trade-Mark Reg. U.S. Pat. Off. © AMP

Find out about the free AMP "CREATIVE APPROACH TO BETTER WIRING"

An evaluation survey without cost or obligation.

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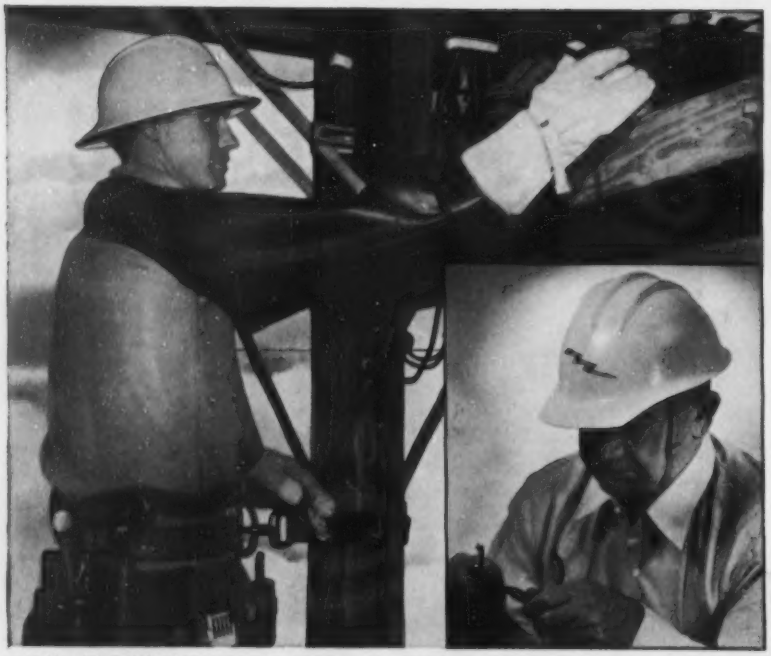
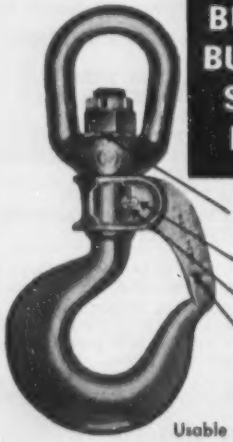
2100 Paxton Street, Harrisburg, Pennsylvania
In Canada . . . . Aircraft-Marine Products of Canada, Ltd.
1764 Avenue Road, Toronto 12, Ontario, Canada



TESTS PROVE* Bullard 10KV safety hats and caps give complete head protection both from head blows from falling wrenches, insulators, "rake-sticks" and from contact with "hot" lines. Every Bullard hat and cap is tested before it leaves the factory to 10,000 volts . . . and every hat and cap passes industrial and federal 40 ft. pound resistance tests. No holes or rivets that might eventually cause leakage pass through crown or brim. Permanent colors available at no added cost. Universal headsize.

ELECTRICAL INDUSTRIES SLASH ACCIDENT COSTS!

BULLARD BURNHAM SAFETY HOOKS



Usable with every type of equipment (chain hoists, horizontal tuggers, come-a-longs, cranes, block and tackle, and snatch blocks). The B-B safety hook provides complete PROTECTION where accidents begin.

CUSTOM DESIGNED FIRST AID KITS

Bullard unit pack first aid kits are available in special packs to meet the accident patterns of electrical industries. Write for new catalog.

EVERYTHING BULLARD IN SAFETY

TESTED 10,000 VOLTS 10 KV

HARD BOILED

T.M.'S REG. U. S. PAT. OFF.

Since 1898

E. D. BULLARD COMPANY

275 EIGHTH STREET • SAN FRANCISCO, CALIFORNIA

Distributors in principal cities around the world

***FREE**—write for Multiphase laboratory report and circular on 10KV hats and caps. Brochure also available on Bullard-Burnham hooks.

SALES ASSIGNMENTS

COMPANY STAFFS

Federal Pacific Electric Co, Newark, N. J., has designated James J. Dugan as Detroit district manager. Previous to this appointment, Dugan, an electrical engineer, worked with Westinghouse Electric Corp's industry sales department.

Minneapolis-Honeywell Regulator Co has made several regional changes. George Maves, manager of the Boston sales office since 1948, was promoted to manager of the firm's Pacific region with headquarters in Los Angeles. He succeeds Gavin S. Younkin, who was recently made general sales manager of the company. R. W. Forster, manager of the Buffalo, N. Y., sales office, was named Maves' successor as manager of the Boston sales office.

Combustion Engineering, Inc, New York, has appointed Warren L. MacDonald as district manager of its Los Angeles, Calif., office. MacDonald, an electrical engineer, joined the sales department of Combustion Engineering in the Los Angeles office in 1951.

Babcock & Wilcox Co's Tubular Products Division has named G. H. Weight Southwest district sales manager. Weight, formerly attached to the division's Chicago office, now will have charge of the division's sales offices in Houston, Tex., and Tulsa, Okla., and will supervise sale of seamless and welded steel tubular products. His territory includes Texas, Oklahoma, Arkansas, Mississippi, Louisiana, and southern Kansas.

General Electric Co's Apparatus Sales Division has appointed W. S. Leake, formerly manager-sales for the New Orleans office, to succeed Harry H. Blakeslee as manager of the Louisiana-Mississippi field sales area. Blakeslee has retired after 43 years with GE, 41 of which were served in the New Orleans area.

International Harvester Co's Motor Truck Division has announced these changes: G. D. Partridge, district manager at Cincinnati, was transferred to the Detroit district as manager. E. D. Maher, formerly assistant district manager at Cincinnati, replaces Partridge as manager there. E. W. Dodson, formerly branch manager at Charlotte, N. C., was promoted to assistant manager at Cincinnati. R. W. Stiegler, formerly assistant district manager at New Orleans, was transferred to Dallas in the same capacity. R. V. Ruth, formerly branch manager at Cincinnati, was advanced to assistant manager of the New Orleans district.

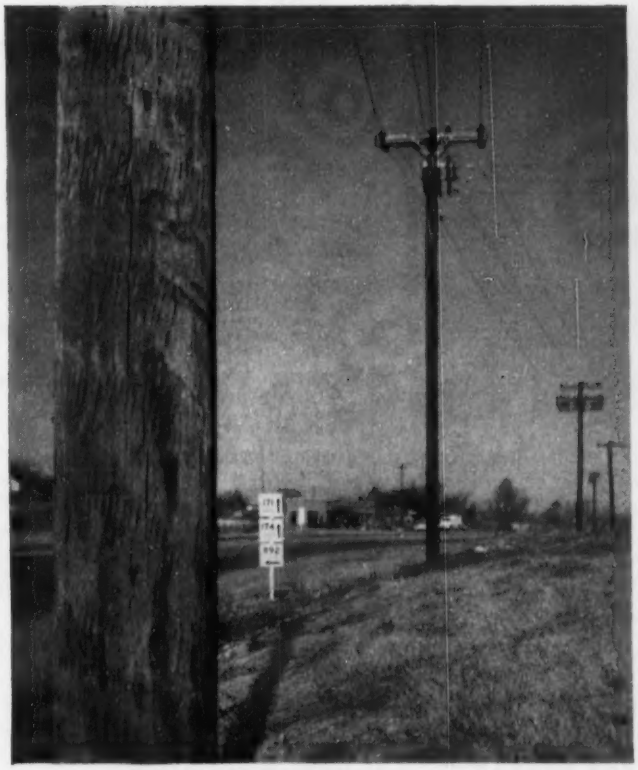
Sprague Electric Co, North Adams, Mass., has appointed Leo J. Dornbos as manager of its new Cleveland office, which is located at 41 North Main St., Chagrin Falls, Ohio. Dornbos, with Sprague since 1950 as a field engineer, will service northern Ohio and western Pennsylvania territories.

John A. Roebling's Sons Corp, a subsidiary of Colorado Fuel & Iron Corp, has named Edwin F. Whitehill as Cleveland district manager for its Wire and Cold Rolled Products Division. With Roebling since 1949, Whitehill since 1950 has covered Roebling accounts in Michigan and Indiana.

DOW

PENTA

the clean preservative for longer pole life



Penta pressure-treated southern pine poles.

Southwestern Bell Telephone makes friends in many Texas cities with its clean poles, pressure-treated with PENTA

THE DOW CHEMICAL COMPANY
Dept. PE-747B-1
Midland, Michigan

☐ Send me free information on Penta-treated poles and crossarms.

☐ Send me a list of PENTA-treating plants.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

Longer pole life pays off in replacement dollars saved—*clean* wood treatment pays off in community good will that's difficult to figure in dollars, impossible to buy. But you get both when you specify PENTA* treatment for all the poles you use.

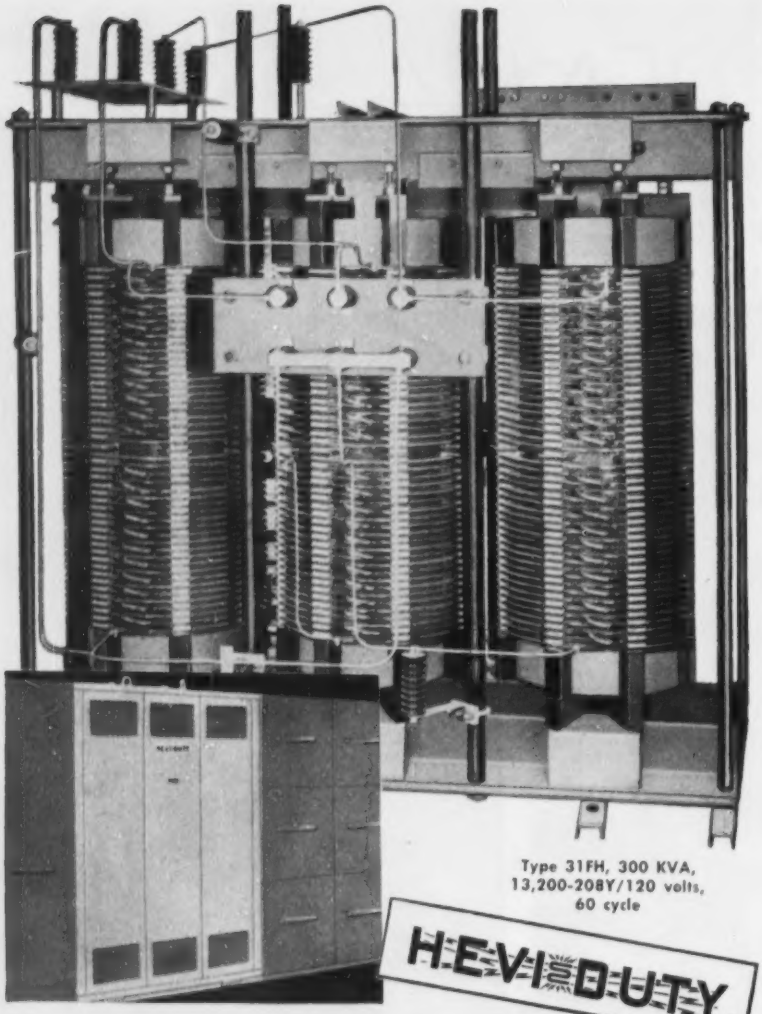
PENTA lengthens the service life of poles and crossarms by providing positive protection against decay and termites. Linemen, too, like to work with *clean* poles.

Over 60 suppliers across the country can furnish you with PENTA-treated poles. Ask your regular supplier about *PENTAchlorophenol, or write THE DOW CHEMICAL COMPANY, Midland, Michigan.

SEE **MEDIC** NBC-TV
MONDAY EVENINGS-SEE YOUR PAPER FOR TIME & CHANNEL

you can depend on DOW CHEMICALS

DOW



Type 31FH, 300 KVA,
13,200-208Y/120 volts,
60 cycle

HEVI DUTY®

Dry Type Transformers

For High Voltage Unit Sub-Stations

Core and Coil Assembly can be supplied separately or as a Unit Sub-Station complete with primary and secondary switchgear according to your specifications.

Hevi Duty Transformers are designed and built to offer that extra protection needed during peak operating periods. Note the adequate core and coil blocking, high voltage insulators and well ventilated pancake type coils on the transformer shown here.

Specify Hevi Duty Transformers in your unit sub-station and you assure yourself of dependable service.

Let our engineering staff design a transformer to meet your specifications.

Write for Bulletin HD-499

HEVI DUTY ELECTRIC COMPANY

MILWAUKEE 1, WISCONSIN

Heat Treating Furnaces... Electric Exclusively

Dry Type Transformers ***Constant Current Regulators***

MEETINGS CALENDAR

(*Continued from page* 111)

tinique, New York, on following dates: Oct. 11, Dec. 6.

IOWA UTILITIES ASSOCIATION
Annual Management Conference, Hotel Fort Des Moines, Des Moines, Iowa, Oct. 11-12.

NATIONAL INDUSTRIAL CONFERENCE BOARD
Third Annual Conference on Atomic Energy in Industry, Hotel Commodore, New York, Oct. 13-15.

NATIONAL SAFETY CONGRESS-EXPOSITION
Conrad Hilton Hotel, Chicago, Oct. 18-22.

OKLAHOMA UTILITIES ASSOCIATION
Electric Light and Power Division, Western District Meeting, Duncan, Okla., Oct. 21; Eastern District Meeting, Ada, Okla., Oct. 22; Annual Convention, Mayo Hotel, Tulsa, Okla., March 24-25, 1955.

AMERICAN WELDING SOCIETY
National Fall Meeting, Sherman Hotel, Chicago, Nov. 1-5.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
Annual Meeting, Haddon Hall Hotel, Atlantic City, Nov. 8-11; Winter Meeting, March 7-11, 1955.

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS
Annual Convention, La Salle Hotel, Chicago, Nov. 8-12.

AMERICAN STANDARDS ASSOCIATION
36th Annual Meeting and 5th National Conference on Standards, Hotel Roosevelt, New York, Nov. 15-17.

WISCONSIN UTILITIES ASSOCIATION
Electric-Gas Sales and Engineering Convention, Schroeder Hotel, Milwaukee, Nov. 17-19.

NATIONAL FARM ELECTRIFICATION CONFERENCE
1954 Meeting, Van Curler Hotel, Schenectady, N. Y., Nov. 18-19.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS
Annual Meeting, Statler Hotel, New York, Nov. 28-Dec. 3.

21ST NATIONAL POWER SHOW
Sponsored by American Society of Mechanical Engineers, Commercial Museum, Philadelphia, Dec. 2-7.

EASTERN JOINT COMPUTER CONFERENCE-EXPOSITION
Sponsored jointly by American Institute of Electrical Engineers, Institute of Radio Engineers, and Association for Computing Machinery; Bellevue-Stratford Hotel, Philadelphia, Dec. 8-10.

ELECTRICAL EQUIPMENT REPRESENTATIVES ASSOCIATION
Annual Meeting, Breakers, Palm Beach, Fla., Jan. 10-12, 1955.

NATIONAL ASSOCIATION OF PURCHASING AGENTS
24th Annual Mid-Winter Conference, Public Utility Buyers' Group, Shamrock Hotel, Houston, Texas, Feb. 13-15, 1955.

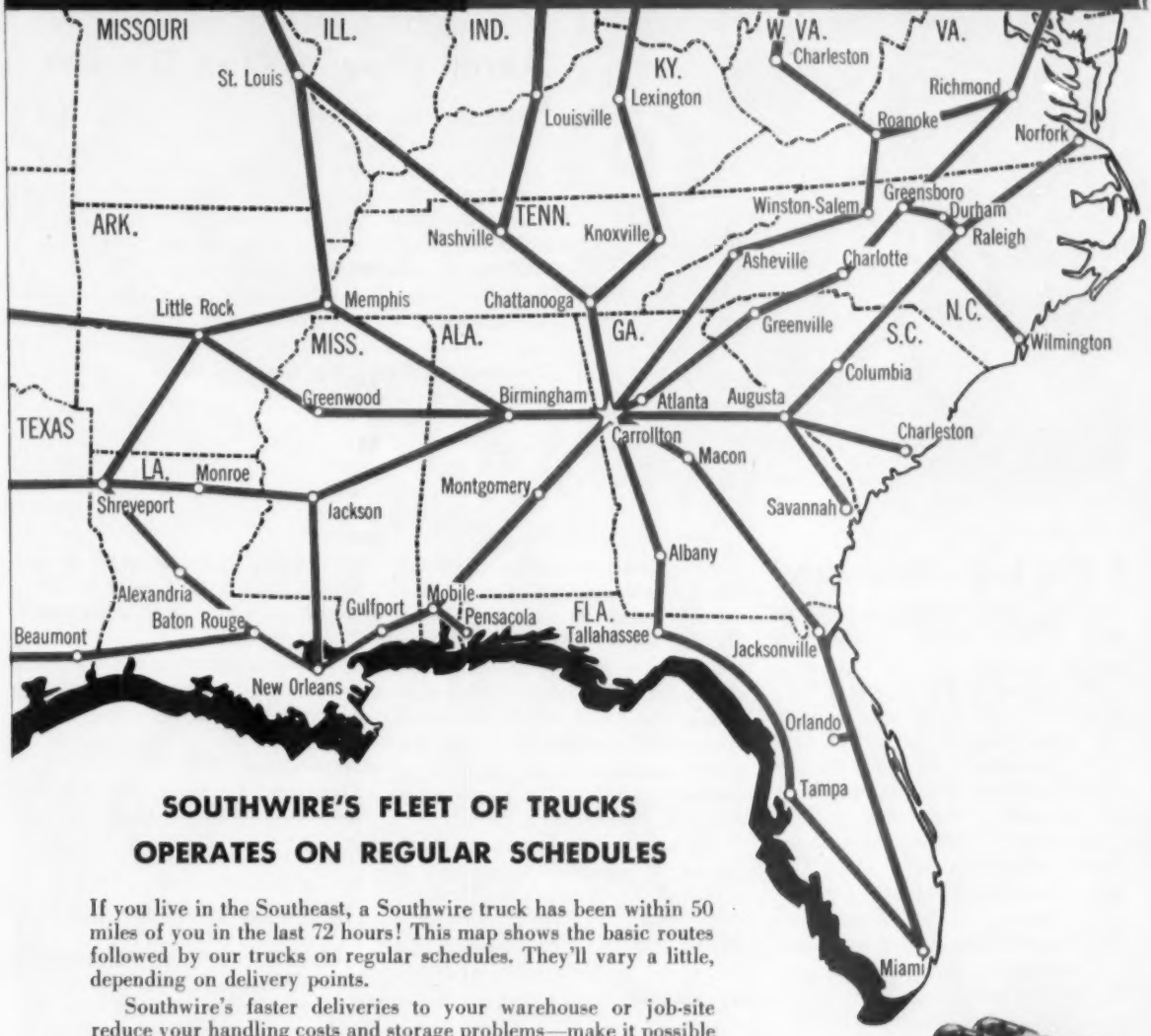
SOUTHERN SAFETY CONFERENCE-EXPOSITION
Jung Hotel, New Orleans, La., Feb. 27-March 1, 1955.

AMERICAN POWER CONFERENCE
17th Annual Meeting, Sherman Hotel, Chicago, March 30-31, April 1, 1955.

ILLUMINATING ENGINEERING SOCIETY
Pacific Northwest Region Conference, Harrison Hot Springs, British Columbia, April 25-26, 1955.

* Additions this week.

Southwire MEANS SERVICE



SOUTHWIRE'S FLEET OF TRUCKS OPERATES ON REGULAR SCHEDULES

If you live in the Southeast, a Southwire truck has been within 50 miles of you in the last 72 hours! This map shows the basic routes followed by our trucks on regular schedules. They'll vary a little, depending on delivery points.

Southwire's faster deliveries to your warehouse or job-site reduce your handling costs and storage problems—make it possible to hold inventories at a minimum. Add the high quality of Southwire products to this superlative service and you have a combination hard to beat. Try us and see!

- Southwire Service assures prompt delivery from the South's largest stocks; emergency deliveries in 36 hours or less; individual attention to every order; courteous, experienced drivers with years of cable-handling experience.

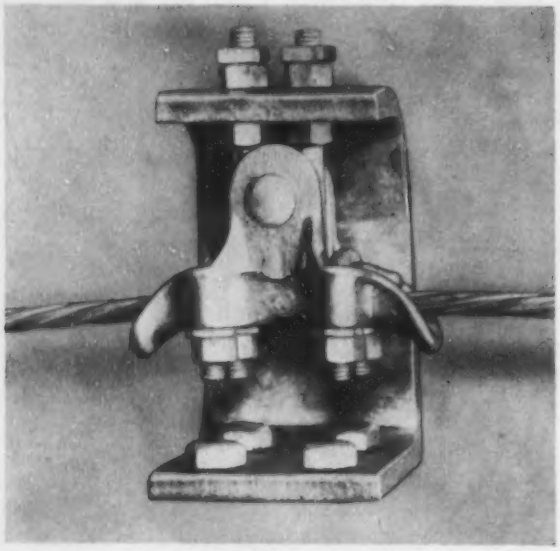
Southwire Company

PHONE LD 1500 CARROLLTON, GEORGIA

SOUTHWIRE PRODUCTS

- Bare and Weatherproof Copper
- Neoprene Copper and Triplex
- Copperweld® Conductors
- Steel Strand
- ACSR and All Aluminum
- Neoprene Aluminum, ACSR, and Triplex
- Cable Accessories and Preformed Products

NEW EQUIPMENT



Aerial Ground-Wire Bracket

Ground wire bracket is designed for attaching over-head ground wire to existing or new tower or H-frame construction. This non-rigid type clamp is claimed to eliminate damage due to ground wire vibration, thereby assuring a permanent, trouble-free installation.

Ground wire bracket can be furnished with various drillings for attachment to steel or wood structures. The forged steel plate is galvanized and is available with either forged steel or malleable iron clamps to fit all types and sizes of ground wire.

Porcelain Insulator Corp, Lima, N. Y.

3-Wire Single-Phase Meter

Single-phase general purpose Type MK watthour meter is nominally rated at 15 amp.

Meter has "extended range" capacity to meter continuous loads to 100 amp without sacrifice of light load performance. The meter is designed to be suited for existing loads and for loads of the future.

Maximum temperature rise of the current coil at 100 amp is about 50 C when installed in a standard pan-type socket. The current coil circuit has no mechanically clamped or bolted joints.

Arc gaps are adjusted to flash over at about 4,500 v rms, or at 50% of the insulation level of the electromagnet. Both current and potential coils are molded in high-temperature polyvinyl chloride.

The basic watthour constant is 0.6. The Alnico damping magnet resists change due to lightning discharge, being less than 0.25% calibration change with discharge current in excess of 50,000 amp.

Duncan Electric Manufacturing Co, Lafayette, Ind.

Microwave Radio

Packaged microwave radio station, MM-9, allows line-of-sight one-hop point-to-point communications. Complete transmitting and receiving equipment is housed in a compact, weatherproofed metal cabinet. The baseband channel extends to 30 kc and is suitable for multiplexing voice, telegraph, and telemetering circuits. Multiplex equipment to provide two voice channels with signaling can be installed in the cabinet. Additional voice or telegraph multiplex units mounted in similar housing can be connected to the radio equipment.

The units may be connected back-to-back for repeater station multi-hop operation. Operation is between 890 and 960 Mc. The unit measures about 5 ft by 2 ft by 15 in. The packaged station is complete with mesh-type parabolic antennas, transmission line, and fittings.

Engineering Products Div, Radio Corporation of America, Camden, N. J.

Conductor Alloy 2EC-T8

Aluminum alloy 2EC-T8 is available as rectangular bus bar and as tubular bus. The alloy is designed for use as distribution bus and for isolated-phase construction. It has considerably higher yield strength and better creep characteristics than previously available electrical conductor alloys (EC). Its high yield strength resists deformation when subjected to high short-circuit forces.

Conductivity of 2EC-T8 is 57%, approaching that of EC-H17. Strength approaches 63S-T6. Tensile strength is 28,000 psi min, and yield strength is 25,000 psi min.

The rectangular bus bar is supplied in the same standard manufacturing tolerances as EC-H13. For tubular bus, tolerances are the same as for drawn tubes.

Aluminum Company of America, 1501 Alcoa Bldg, Pittsburgh 19, Pa.

Hook-On Volt Ammeter

Pocket-size hook-on volt-ammeter, Model AK-4, has ranges of 10/30/100/300/800 amp ac and 150/300/750 v ac. Scales automatically change when range selector knob is turned, reducing the possibility of reading a wrong scale. Accuracy is 3% of full scale on 60 cps. It measures 9⅛ x $3\frac{7}{16}$ x $1\frac{9}{16}$ in.

General Electric Co, 1 River Rd, Schenectady 5, N. Y.

Circuit Breaker

Plug-in type enclosed air circuit breaker provides protection for general commercial and industrial applications. Continuous ratings are 1,600 amp and less. Back portion of enclosure can be mounted on wall and

(*Continued on page* 198)

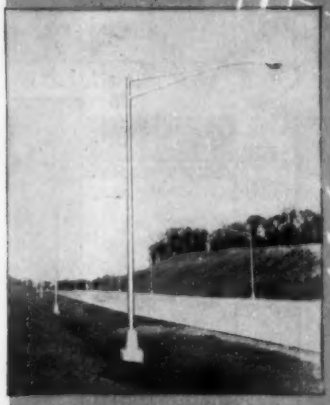
● A Massachusetts town has converted valuable existing, old style pedestal standards to a modern lighting system by using Hapco top extensions with brackets.

● Hapco Floodlight Poles on car lot in Houston, Texas. Special lowering device permits maintenance from the ground.

● A city in the Northwest finds the extra strength needed for heavy flourescent luminaires in Hapco Poles, even under strong wind and ice loading.

Versatile

HAPCO ALUMINUM ALLOY STANDARDS



● Hapco Lighting Standards and Brackets at the new Valley Forge Interchange of the Pennsylvania Turnpike.

● Hapco Pedestal illuminated sign posts furnished to Highway Department, State of New Jersey. Easy access to wiring is provided in the base.

● Hapco pedestals provide beautiful illumination for parks.

● A Hapco traffic light pole stands, appropriately, at the corner of the Alcoa Building, Pittsburgh, the first skyscraper to be erected with all aluminum exterior.

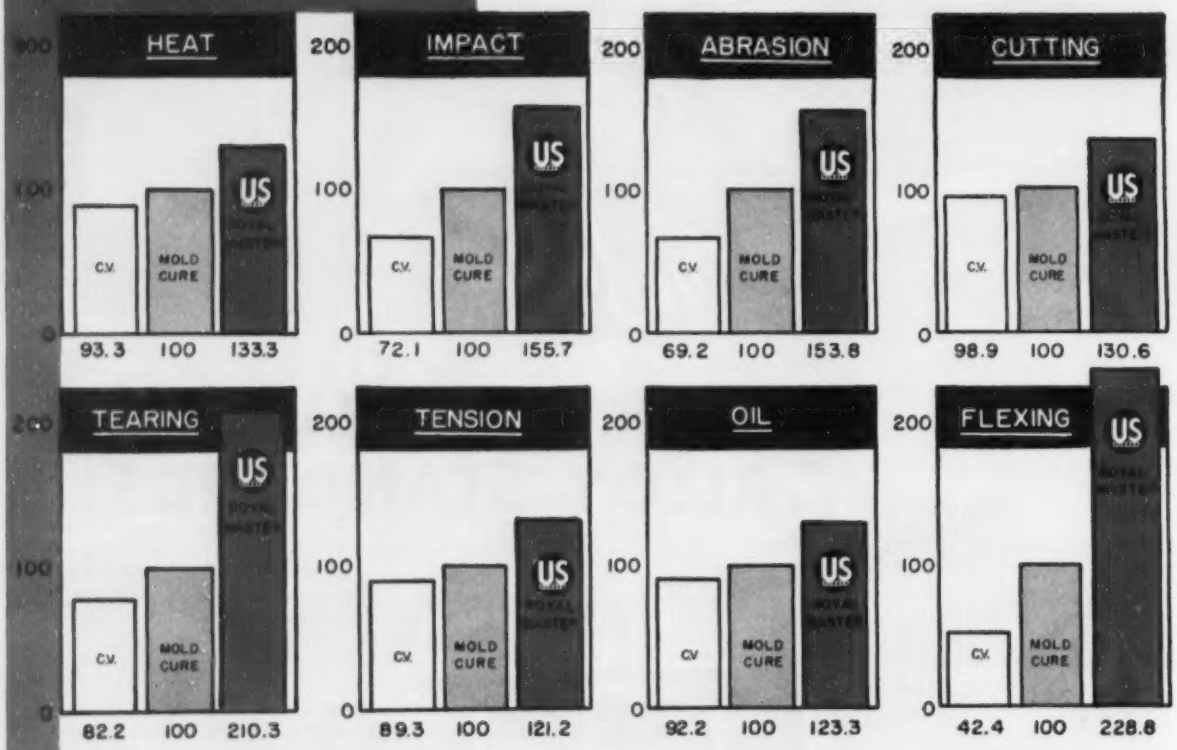
HUBBARD ALUMINUM PRODUCTS COMPANY

MANUFACTURERS OF HAPCO QUALITY ALUMINUM PRODUCTS

A Division of HUBBARD and COMPANY

6301 Butler Street • Pittsburgh 1, Pa.

New U.S. ROYAL outperforms,



Comparative performance of portable cords related to major life factors.

Graphs illustrate the outstanding superiority of new U. S. Royal Master Cord—over the average of molded cords and the average of short-lived continuous vulcanized cords of other makes—on every major life factor. (Average of other molded cords is rated at 100%.)

US RUBBER

UNITED STATES

ELECTRICAL WIRE AND CABLE DEPARTMENT

MASTER portable cord *outlasts all others!*

Comparative tests show U. S. Royal Master gives $1.88 in value for every $1.00 spent — almost *twice* the service value of the average of other molded cords!

LOOK FOR THE NAME — U. S. ROYAL MASTER

Two years ago, "U. S." engineers began a *complete reexamination* of portable cord construction, service life, and the causes of cord failure.

Over 10,000 tests were made. More than a thousand cords of all leading makes, including our own famous U. S. Royal Cord, were analyzed, tested, and compared.

Every life factor was considered and carefully evaluated, alone and in its relation to overall cord performance and service life.

Backed by 64 years of experience in the manufacture of electrical wire and cable, U. S. Rubber engineers then translated their findings into an entirely new portable cord, designed to surpass any other previously made.

Extensive tests, both in the laboratory and in outside plant installations have proved this new portable cord startlingly superior in every respect!

New U. S. Royal Master is unquestionably the finest cord you can buy!

From every standpoint, as the charts at left illustrate, new U. S. Royal Master is a finer, more durable cord—actually gives 88% longer life than the average of competitive molded cords—far longer than *any* other cord—surpassing even a hypothetical cord incorporating the best features of all those tested!

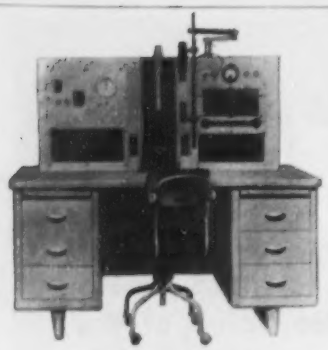
Far greater value, too! In spite of almost doubled service life, this great new cord is in the same price category as other molded cords—giving you $1.88 in cord value for every cord $1.00!

Prove to yourself the outstanding superiority of new U. S. Royal Master Portable Cord — in both service life *and* economy! Get in touch with your "U. S." distributor today!

Approved by Underwriters' Laboratories, Inc.

RUBBER COMPANY

ROCKEFELLER CENTER, NEW YORK 20, N. Y.



Save time testing watthour meters with the

KNOPP

Meter-Testing Equipment, Type TE-7

Power companies the nation over, save time, save money, and build customer goodwill when testing watthour meters with the Knopp Meter-Testing Equipment.

Its new, more-convenient switching arrangement for connecting meter elements permits 2-element and 3-element polyphase meter testing without changing connections. Has Knopp Uniload System enabling testing of both elements of a 3-wire, single-phase meter simultaneously without opening the potential link.* Basic constant of rotating standard adjustable to match basic constant of meter-under-test.* Includes photoelectric counter and other time-saving features for accurate testing.

Tests all types of watthour meters. Provides voltage ranges of 120, 240, and 480; current ranges of .25, .5, 1, 1.5, 2.5, 5, 10, 15, 25, and 50. Overall equipment accuracy within .05%.

*Patents Pending

For Fast Field-Test of Watthour Meters, use the Knopp Uniload Test Set, Type FS-5, up to 50 amps. Type FS-4 tests meters of 5 and 15 amps. Easy to use, rugged, reliable.

The Knopp Phase Sequence Indicator — for 3-phase 3 wire and 3-phase 4 wire; 60 volts to 600 volts. Rotating Indicator shows sequence A-B-C or C-B-A. Lightweight, compact. Big timesaver.

Also: Knopp Precision Transformers; Knopp Uniload Equipment for testing instruments and instrument transformers.

For complete technical descriptions please write us today

KNOPP

Electrical Facilities Inc.

4236 Holden St., Oakland 8, Calif.

New Equipment

(*Continued from page* 194)

easily wired before the manually or electrically operated breaker is plugged into the stationary contact fingers. The front cover is then installed to complete the unit.

An interlock automatically throws the breaker to the off position as the front cover is removed. Solderless terminal lugs are used. The breaker may be padlocked.

Roller-Smith Corp, 1000 Eighth Ave, Bethlehem, Pa.

Motor Restarter

Time-delay push-button station conduit (Type OFC) restarts motors automatically to minimize disconnections because of low voltage or voltage failure. The device can be set to restart motors within time limits of 2, 4, or 6 sec. The explosion-proof and dust-tight device is designed for use at Class I, Group D; Class II, Groups E, F, and G; or Class III hazardous locations.

Interior equipment of the device includes a push-button switch, capacitor, rectifier, sensitive relay, and control relay. In addition, a transformer for voltages exceeding 110 is supplied, with capacities of 220, 440, and 550 v. Time delay of 2, 4, or 6 sec is determined by the position of a wire on a terminal block. Body of device has vertical through-feed hubs for threaded conduit.

Crouse-Hinds Co, Wolf & Seventh North St, Syracuse, N. Y.

Magnet Brakes

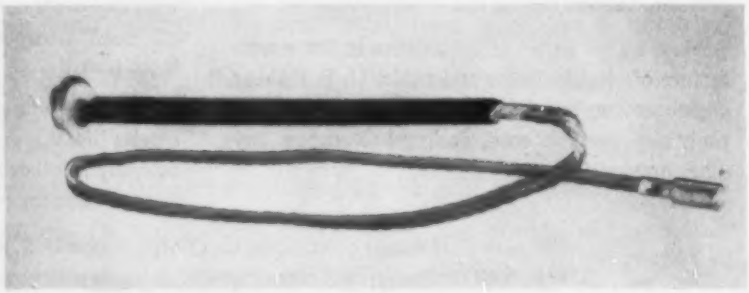
A complete line of dc magnet brakes features single-point adjustment. Brakes meet the Association of Iron and Steel Engineers' dc mill motor brake standard No. 11. They are used for heavy duty applications in mill drives, materials handling, marine service, and on bridges The line covers 8-, 10-, 13-, 16-, 19-, and 23-in. diameter wheels.

General Electric Co, 1 River Rd, Schenectady 5, N. Y.

Hydraulic Derricks

Hydraulic derricks, Models HF-19 and HT-25, have a 100-deg useful arc power-operated range, and will lower completely to the ground under full power. Load capacities range up to 6,000 lb. Mounting is front or rear on standard line trucks. Derrick can

(*Continued on page* 201)



HV Fuse Links

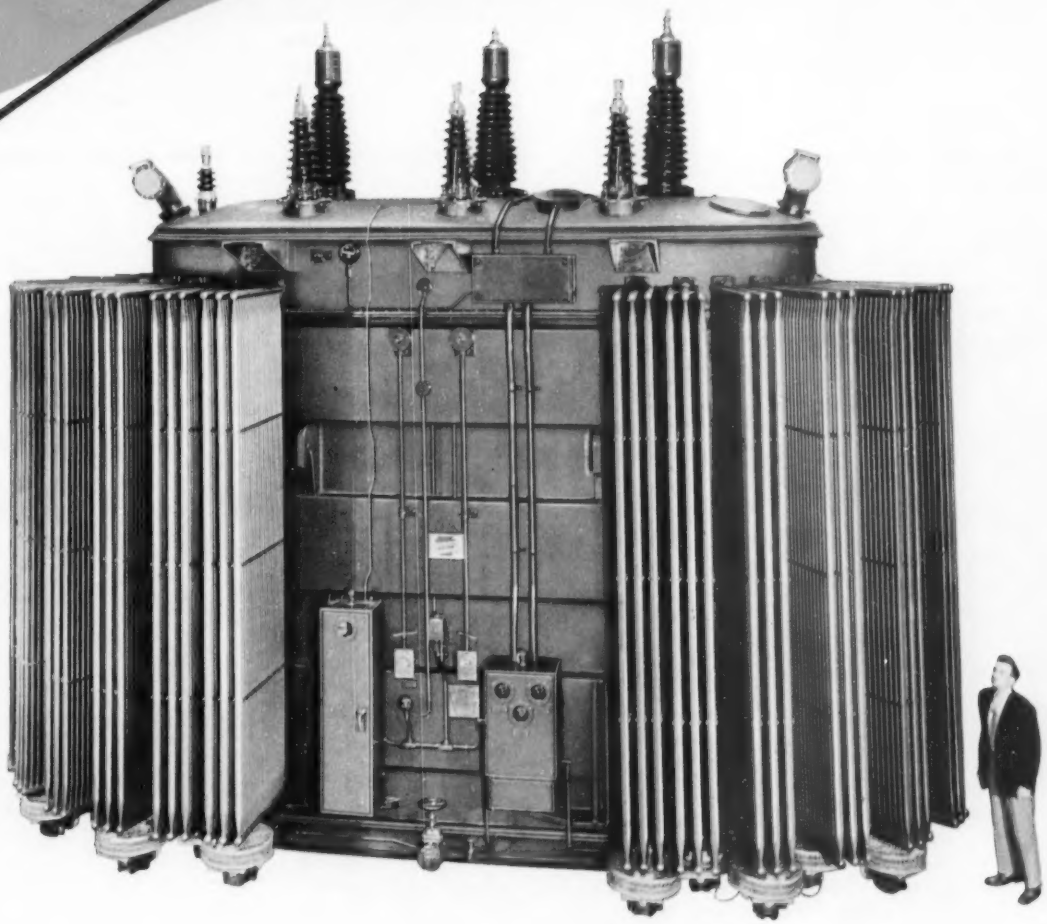
Fuse links, Type AK and AT, have melting time-current characteristics that meet EEI-NEMA standards for distribution fuse links. Arc-quenching ability at overload or restricted fault conditions is claimed to be greatly improved. Boric acid powder located in intimate contact with the rupturing link volatizes, building a vapor pressure high enough to quench the arc. In addition, the pressure is claimed to expel the lower end of the fuse link with greater velocity than obtained with a spring.

Universal type fuse links are adapted to fit double-vented cutouts from 5 through 17 kv by removing the screw-on button head and cutting the flexible cable to give a double pigtail link. External metal parts are silver plated.

Southern States Equipment Corp, Hampton, Ga.

100,000 Kva THREE PHASE

Pennsylvania Auto Transformer



Tying in a 69 Kv system to a 138 Kv system is the function of this 100,000 Kva forced-air cooled Pennsylvania Power Transformer. When operating without fans, the transformer carries a rating of 60,000 Kva. With ½ of the fans in operation, the transformer will deliver 80,000 Kva. In addition to a high voltage rating of 132,000 volts and a low voltage rating of 67,700 volts, the transformer has a tertiary voltage of 2400 volts at 13,100 Kva.

PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division • **CANONSBURG, PA.** • *Greater Pittsburgh District*

For inside story see next page . . .

Inside a 100,000 Kva *three phase*

Pennsylvania Auto Transformer

Tap changers are mounted above core and coils where they are easily reached through large manholes in the tank cover.

Tap leads are connected to straight line tap changers through heavy pressboard tubes.

Two sets of taps per coil assure proper electrical and mechanical balance in the high voltage windings.

Coils are precompressed with a force equal to the highest short circuit stress and built into transformer at the compressed dimension. This prevents mechanical distortion of the coils if short circuit stresses occur.

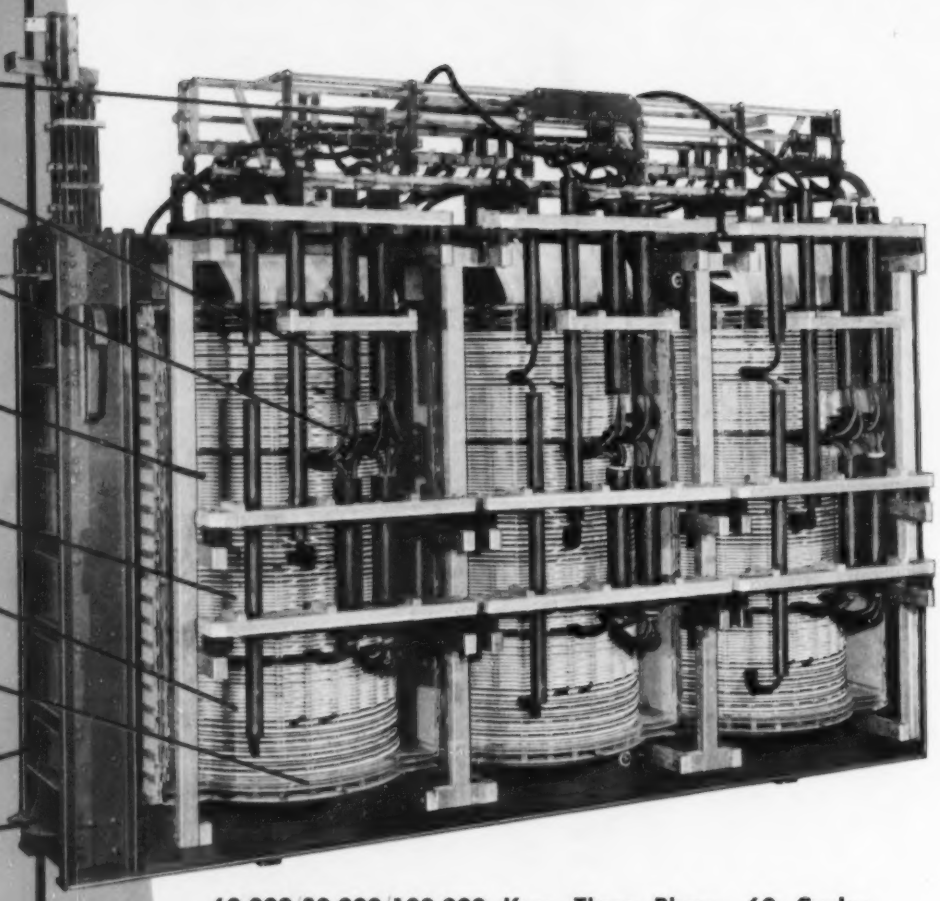
Circular coils electrically balanced both radially and axially against short circuit stresses.

Continuous pancake windings in high voltage and low voltage coils. Helical windings in tertiary coils.

Line ends of coils are heavily insulated to provide extra protection against surge voltage stresses.

Five-legged core reduces height of transformer.

Guide plates fix the position of the core and coil assembly in the tank.



60,000/80,000/100,000 Kva, Three Phase, 60 Cycles, 55°C. Temperature Rise. Forced-air cooled.
High voltage: 132,000 Grd.Y • Low voltage: 67,200 Grd.Y
• Tertiary voltage: 2400Δ (13,100 Kva).

◀ external view of transformer
see other side

PENNSYLVANIA TRANSFORMER COMPANY
A McGraw Electric Company Division • **CANONSBURG, PA.** • *Greater Pittsburgh District*

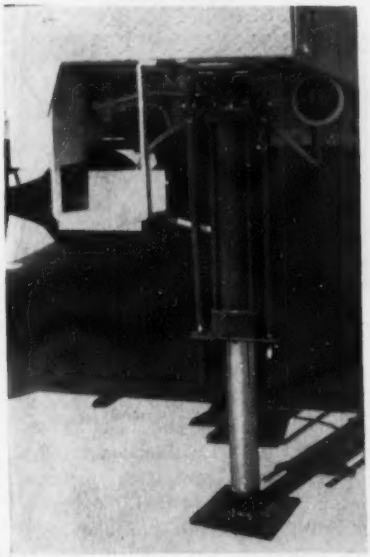
New Equipment

(*Continued from page* 198)

be moved from carrying to working position in 30 sec.

Structural features include tripod leg design, double-acting cylinder with built-in oil lines, and steel guard tubing fully encasing piston rods.

American Truck Equipment Co, Swan Island, Portland, Ore.



Hydraulic Jack

Self-stowing, 14,000-lb capacity hydraulic jack is for use on line construction units, or is available as optional equipment on the Holan 3700 Model HL power operated derrick. This Model 4095 support jack is operated by a control lever near the derrick controls. The operator may level the rear of a truck quickly, or raise the truck for placing chains on tires or replacing wheels.

A double-acting cylinder adjusts jack from 25 to 39⅝ in. in height. Check valves automatically lock jack in any position.

J. H. Holan Corp, 4100 W. 150 St, Cleveland 11, Ohio

Mobile Tower

Portable, 30-ft extending tower for mounting on utility trucks operates hydraulically by power take-off from truck's engine. This 4-stage tower is electrically controlled from the platform. It raises or lowers quickly from 9 to 30 ft. The platform man can signal the driver with a buzzer connected in the cab.

General Machine & Welding Works, 1100 East Second St, Pomona, Calif.

Portable Hoist

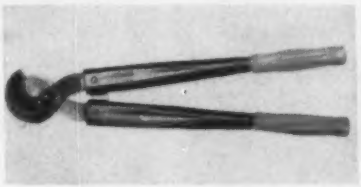
This 1½-ton hoist, the Little Mule, is said to have ample overload safety factors for line construction and maintenance. It has 13 ft of 7/32-in. pre-formed aircraft cable with guaranteed single strength of 5,600 lb. As a safety feature, the 20-in. handle is designed to bend when the hoist is overloaded. Pull is 13 ft with single cable; 6 ft with double cable. In normal use it is claimed that sand and grit have no effect on the hoist.

Royal Electric Manufacturing Co, 1122 E. 87th St, Chicago 19, Ill.

Safety Switch

A new 200-amp Type D safety switch is now part of the Federal Noark Fuse Line. Switches are side operated, and feature quick break and accelerated make. It has visible blade construction, ample gutter space on each side for easy wiring, patented fuse holder, and optional use of solder or crimp-type lugs.

Federal Pacific Electric Co, 50 Paris St, Newark, N. J.



Cable Cutter

Tool cuts armored (BX) electrical cable as well as copper and aluminum conductor to 4/0 AWG. The T&B No. 364 cable cutter has specially ground and hardened, blunt cutting edges. Blades are forged steel with ⅛-in. overlap, thus allowing repeated sharpening.

The heart-shaped opening is claimed to provide a sliding, slicing action that forces the cable toward the tool's fulcrum. This is said to reduce the re-

When you plan...

POWER DAM GATES

ask us about design and patterns that may help you . . .

MURCO GATES AND GATE HOISTS

Backed by over 60 years experience

MURCO

for any Size Power Dam

In planning gates or gate hoists, you may save time and money if you will write us before your over-all plans are complete . . . In over sixty years of designing and building power dam gates and gate hoists, we have developed designs for many gate and gate hoist problems. For that reason, we may have designs and patterns that will fit your special requirements. MURCO gate hoists are designed and built in a wide range of capacities, from less than one ton to over one hundred tons . . . from the smallest hand operated to the largest motor operated gate hoist.

We also build gate hoists to fit your plans and specifications. Write for complete information and Engineering Department recommendations.

D. J. MURRAY MANUFACTURING CO.

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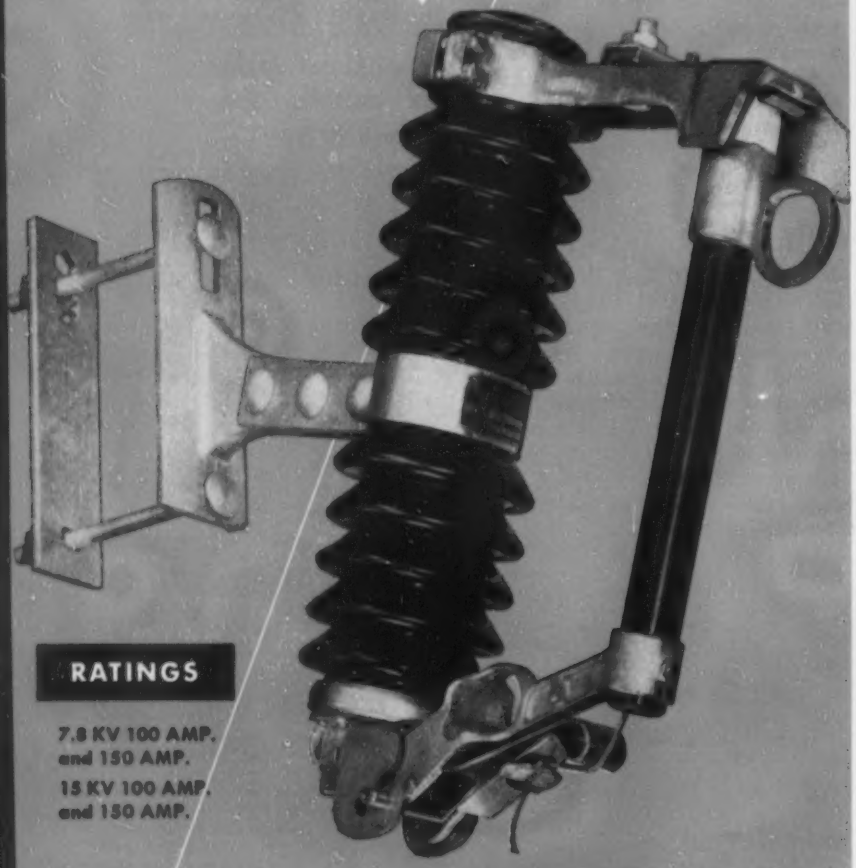
FAST ACTION and RELIABILITY

Specify Joslyn Cutouts



RATINGS

7.8 KV 100 AMP. and 150 AMP.

15 KV 100 AMP. and 150 AMP.

LOAD BREAKER

Equipped units for interrupting full load current ratings are available at slightly extra cost.

SWITCH BLADES

200 AMP. available for both 7.8 KV and 15 KV.

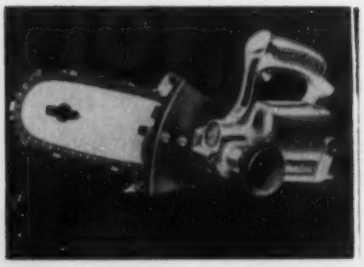
JOSLYN

Joslyn Mfg. and Supply Co.
Executive Offices
20 N. Wacker Dr.
Chicago 6, Ill.

quired cutting effort and eliminate burring or deforming—the cable retains its round shape after cutting.

The tool will also cut non-metallic sheathed cable, service entrance cable, communications cable, service cords, rope and garden hose, flexible conduit, trench cable, etc, up to a diameter of one inch.

Thomas & Betts Co, 36 Butler St, Elizabeth 1, N. J.



Chain Saw

Compact, electric chain saw, Model 128 Limb Saw, weighs 7½ lb, and measures 16-in. overall. It can be held in one hand, and is designed to fill a need of utility crews, tree surgeons, farmers, etc. It is said to quickly prune branches up to 7-in. diam.

The Oregon chipper chain runs at 1,100 fpm. Motor is 115 v universal ac-dc.

Porter-Cable, 47 Exchange St, Syracuse, N. Y.

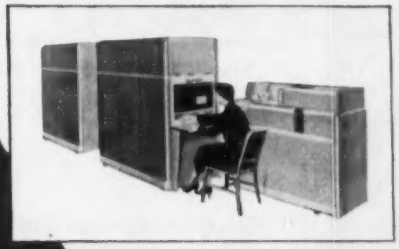
Guillotine Saw

Portable pipe saw cuts 2 to 8 in. castiron and steel pipe as well as bar stock and beams. It operates in a space 25-in. wide and weighs 120 lb. Chain pipe vise clamps guillotine saw to pipe—V-saddle base assures a square cut. Saw is supplied with air or electric motor.

E. H. Wachs Co, 1525 N. Dayton St, Chicago 22, Ill.

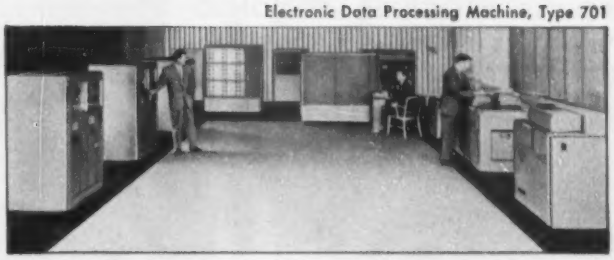
Level Indicator

Explosion-proof continuous level indicator is designed for installation in hazardous areas. These electronic Telstors meet requirements of Class I, Groups C and D; and Class II, Groups E, F, and G locations. The instru-

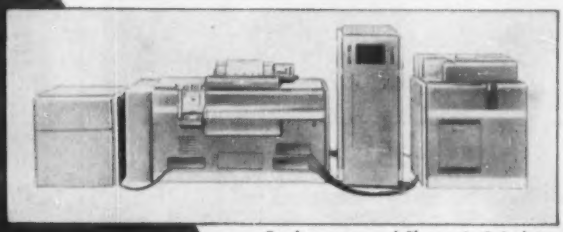


Magnetic Drum Data Processing Machine, Type 650

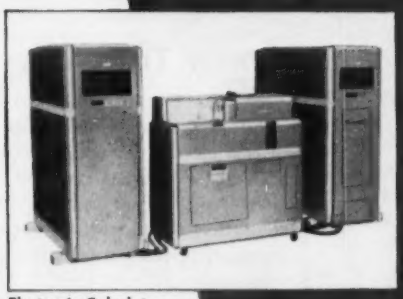
Electronic Data Processing Machine, Type 701



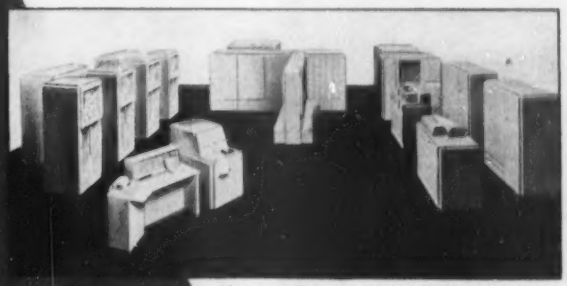
Electronic Calculator, Type 604



Card-programmed Electronic Calculator



Electronic Calculator, Type 607



Electronic Data Processing Machine, Type 702

Whatever your needs in electronic data processing...

IBM offers the only *complete line* of electronic accounting machines, utilizing all proved systems of data recording and processing.

In virtually every field—from engineering calculation and scientific research to business accounting—IBM machines are helping speed progress.

There's an IBM electronic data processing machine to fit your particular needs—and budget.

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INTERNATIONAL BUSINESS MACHINES
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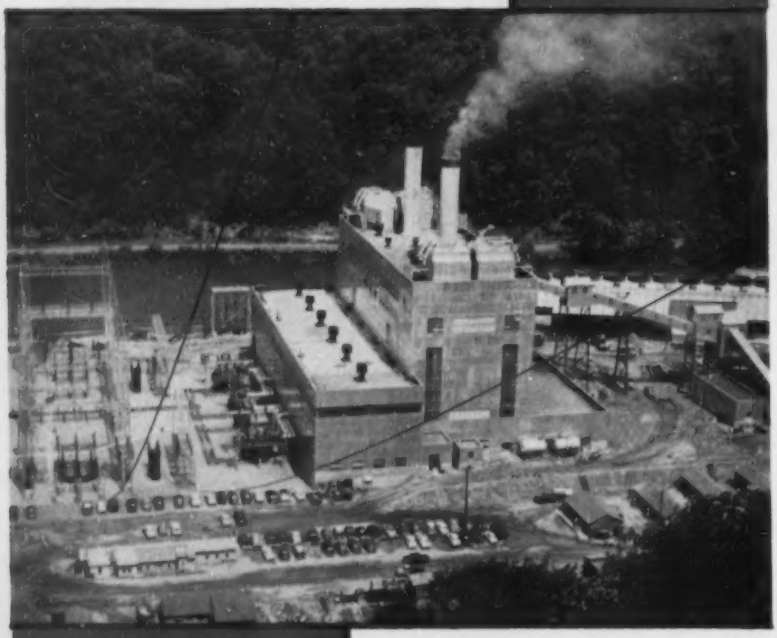
SHAWVILLE

AN OUTSTANDING CONTRIBUTION TO POWER PROGRESS—DESIGNED BY GILBERT ASSOCIATES, INC.

SHAWVILLE STATION OF PENNSYLVANIA ELECTRIC COMPANY



RATED CAPABILITY 250 MW in two identical units operating at 1800 psig and 1050° F. with reheat to 1000° F.

Both boilers are fired with pulverized coal.

Generation at 18.0 KV transformed to voltages up to 220 KV for transmission.

A cooling tower supplements the minimum flow of the west branch of the Susquehanna River which supplies circulating water.

Initial operation has demonstrated the station's ability to substantially exceed the rated capabilities and to operate at design efficiency.

Engineering design and construction supervisory services by Gilbert Associates, Inc.

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GILBERT ASSOCIATES, INC.

ENGINEERS • CONSULTANTS • CONSTRUCTORS

607 WASHINGTON ST., READING, PA.

NEW YORK • WASHINGTON • PHILADELPHIA

ment measures conducting or nonconducting liquids, powders, and granular solids.

Robertshaw-Fulton Controls Co, 2920 N. Fourth St, Philadelphia 33, Pa.

Flowmeter

Electronic flowmeter gives instantaneous direct readings of gas flow in 50 to 10,000 cc per min range. Unit weighs 27 oz. Directly-heated thermocouple gauge tube can be placed in line for low flow rates. Calibration is logarithmic, and accuracy is 2%; response time is ½ sec.

Hastings Instrument Co, Inc, Warwick, Va.

Process Timer

Process timer, Type TSA-21, will control the timed simultaneous closing of one electric circuit and opening of another. Suggested uses are for precision control for starting automatic substation equipment, for reclosing of automatic circuit breakers, and industrial processes.

Timer features one-knob control. Timing is initiated by an electrical impulse. It weighs 6¾ lb.

General Electric Co, 1 River Rd, Schenectady 5, N. Y.

Ground Detector

Ground detector and alarm warns of accidental grounds on power lines as they occur. On the face of this Brunt instrument are three phase indicator lights, a red bull's-eye warning light, fuse holder, neon indicating

(*Continued on page* 208)

"DO IT YOURSELF" MAINTENANCE TIPS
from the GOULD Plus-Performance Plan

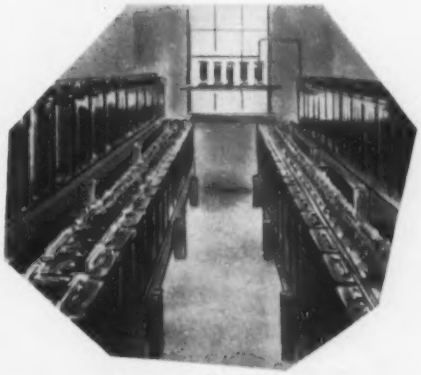
HERE'S MONEY-SAVING MAINTENANCE TIP #1

"AN EASY WAY TO CUT BATTERY-POWER COSTS"

BEST WAY TO INSTALL GLASS JAR CELLS ▸

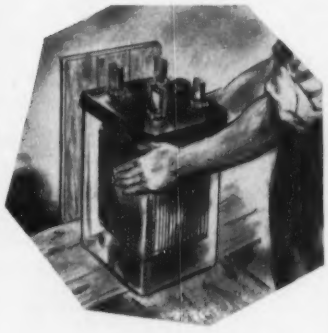
1. *Locating Battery Rack* ▸

Rack should be so located that all cells are accessible. Rack must be level, coated with acid-resistant paint and insulated from floor. If more than one rack is used they should be insulated from each other.



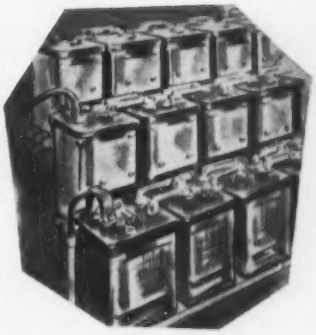
2. *Uncrating* ▸

Remove top and sides of boxes in which cells are shipped. Slide cells or trays out of boxes. Do not lift by terminals. Lift by supporting from beneath.



3. *Installing* ▸

Place *all* cells on rack before making connections. Clean all contact surfaces and coat with vaseline. Start in center of a row and attach connectors, lining up cells in a straight line. Check for polarity and over-all voltage with voltmeter.



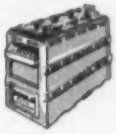
GOULD Batteries

GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.

For Railroad Air Conditioning and Lighting

For Mine Shuttle Cars and Locomotives

For Electric Industrial Trucks


For Diesel Locomotive Starting

For Standby and Emergency Power

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Always Use Gould-National Automobile and Truck Batteries

This is only one example of the many helpful service tips contained in the Gould Plus-Performance Plan. For the complete set of published information on battery service and maintenance mail the coupon TODAY.

BATTERY INFORMATION HEADQUARTERS
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Please send me, without charge or obligation, the Gould Plus-Performance Plan for _____ batteries.
(type or types)

Name _____

Firm _____

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City _____ Zone _____ State _____

Plenty of Copper..

today and tomorrow

The assurance that copper is in abundant supply and *can be used without restrictions* is the "go ahead" for industry. You can now rate PERFORMANCE over AVAILABILITY when choosing materials. By using copper and its alloys, brass and bronze, your product is easier to fabricate, better and more durable.

We can get more copper than we now have. Although industry and government have been consuming more copper than in any previous peacetime period, production has kept pace with this increased demand. And producers are not working at full capacity!

More copper keeps on coming. Eleven major new projects in the U. S. will start producing in the next 3 years. These mines will add 250,000 tons to our annual production—more than *¼ of all the domestic copper mined during 1953*. In addition, recent improvements in mining techniques now make it possible to obtain copper from ores considered commercially unworkable in the past.

Copper is virtually indestructible. At least 3 out of every 4 pounds of copper used in today's products, when scrapped, can be re-used in the future. Every day we are adding to our "copper capital". The more copper we use . . . the more we have!

Copper or its alloys provide these advantages . . .

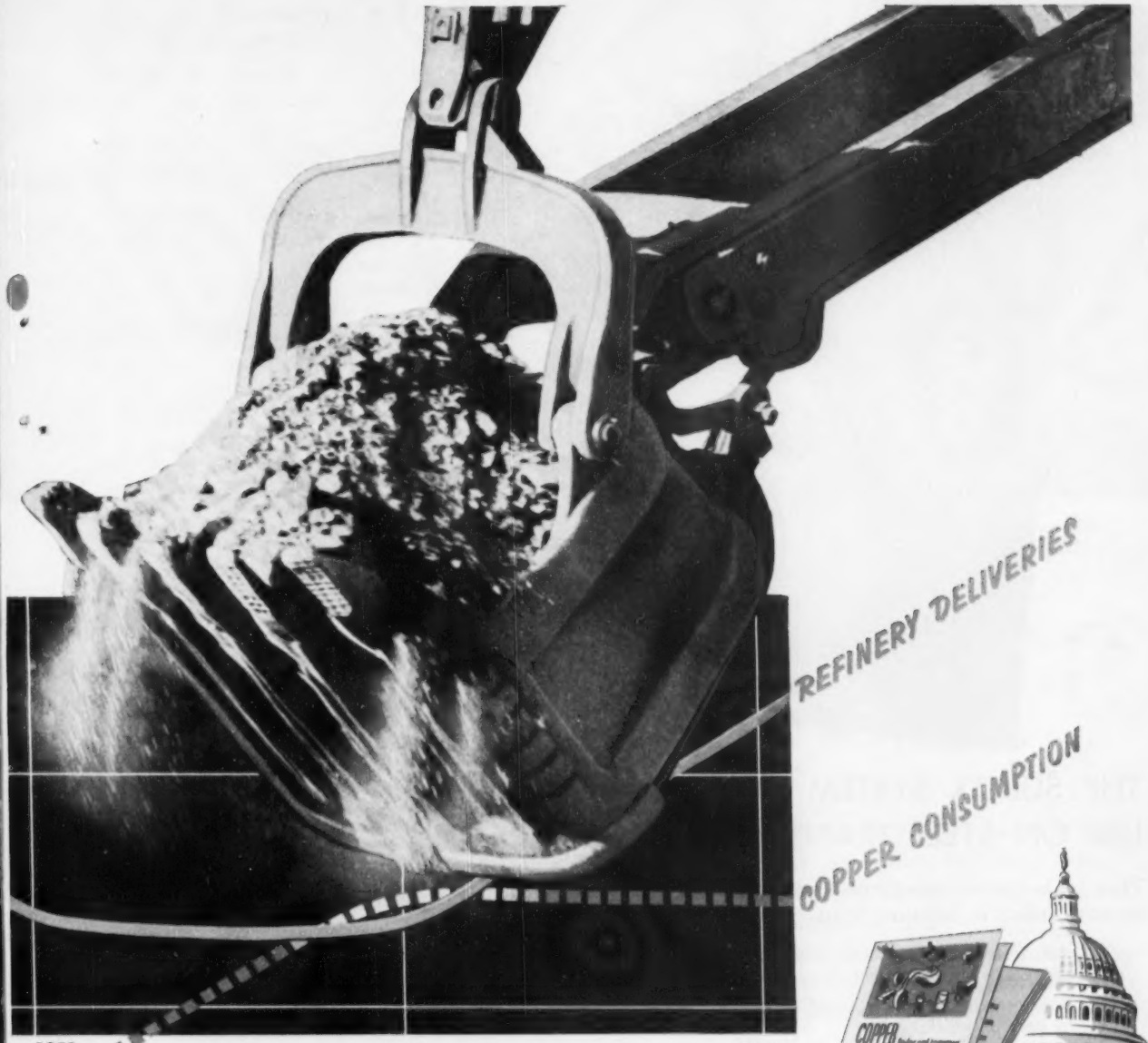
Best conductor of electricity commercially available.

Does not rust . . . high corrosion resistance.

Best heat transfer agent of all commercial metals.

Easy to machine, form, draw, stamp, polish, plate, etc.

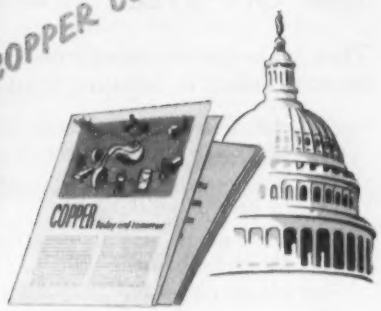
Welds readily . . . excellent for soldering and brazing.



Source—American Bureau of Metal Statistics Year Book 1953

Copper has a new ability to serve you. Many of your problems are being solved in the laboratories of the copper and brass industry. Whether it's a new alloy, a different temper or a special property . . . copper can help you develop new ideas. Copper can bring old methods up to date. Call a supplier of copper and brass and convert your thoughts to action!

COPPER & BRASS
Research Association



❇ ***"Copper . . . is fortunately available in ample supply to meet any foreseeable demand"***

Foreword, U. S. Dept. of Commerce
B.D.S.A. Copper Quarterly, August 1954

For information about U. S. copper supplies including free copies of this Government report and the new booklet, "Copper . . . Today and Tomorrow", send attached coupon to:

Copper & Brass Research Assn., Dpt. H
420 Lexington Ave., New York 17, N. Y.

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COMPANY .....

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THE SUBOX SYSTEM IS PREFERRED FOR USE ON STEEL TRANSMISSION TOWERS

This wide-spread acceptance and confidence has developed because Subox & Subalox paints

1. Adhere well and are thoroughly rust-inhibitive, containing a chemically active pigment of lead-suboxide.
2. Reenforce the galvanizing and do not fail after a few years by peeling or flaking.
3. Resist normal acid and alkali exposure and stand up well under abrasive conditions.
4. Closely match the galvanizing and maintain a neat uniform appearance — further good public relations.
5. Life of a Subox paint job averages 5 to 8 years. Makes single coat maintenance highly desirable from a cost standpoint.
6. Efficiently protects all other types of electrical equipment and structures, simplifies stock-keeping.

A new Handbook of practical recommendations for simplified maintenance is just off the press. Entitled, "CORROSION CONTROL OF ELECTRIC LIGHT & POWER STRUCTURES AND EQUIPMENT". It is yours for the asking.

Subox Inc.

3 Fairmount Plant, Hackensack, N. J.

New Equipment

(*Continued from page* 204)

light, and manual reset button.

In operation, the three phase lights glow with equal intensity. When a ground occurs the corresponding phase light will dim or go out. The red warning light will flash, and a relay actuates an audible signal, such as a bell or horn. When the reset button is pushed, the audible signal is stilled, but the red light remains on until the ground is cleared.

Parr Manufacturing Corp, 44 Austin St, Newark 5, N. J.

Flexible Connector

Flexible braid connector features a protective vinylite covering. Made of extra-flexible, flat, tinned copper braid with seamless copper ferrules on each end, the connector provides protection against corrosive atmosphere and abrasive particles.

Entire braid section is covered with vinylite and secured within the ferrules by compression. Connector is suggested for plating operation applications.

Burndy Engineering Co, Inc, Norwalk, Conn.

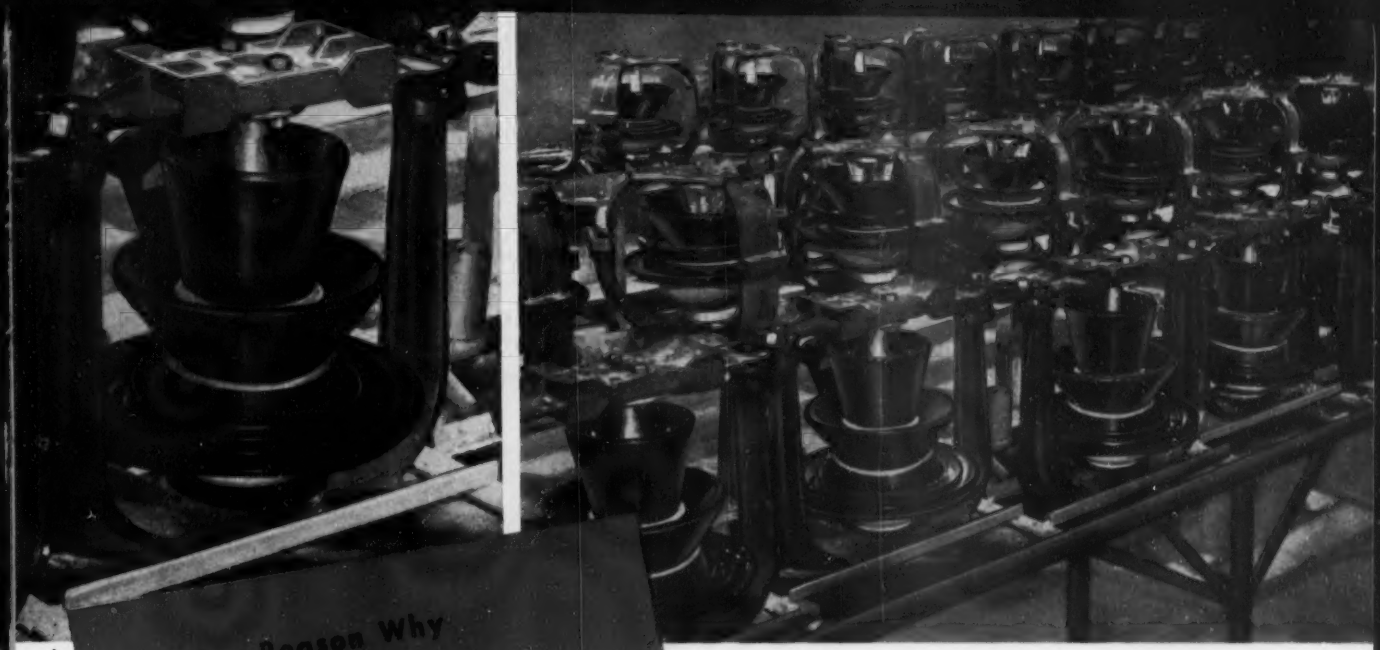
Photocopy Machine

Dry copies of typed, printed, or written material are produced by the Hecco-kwik in 45 seconds. Material up to 12 in. wide, any length, may be reproduced. The machine occupies little more space than a typewriter. Half-tones are registered.

Hunter Photo Copyist, Inc, 86 Spencer St, Syracuse, N. Y.

Microfilm Machine

Microfilming machine for office use combines recording and reading in one compact, portable unit. This Bell



Left: Victor uses seasoned cast-iron jigs for greatest accuracy.
Above: Victor Apparatus Insulators assembled in precision-aligned jigs.

Another Reason Why

VICTOR Makes Better Insulators

WE USE ACCURATE JIG ASSEMBLY METHODS

APPARATUS INSULATORS require accurate assembly of porcelain and metal parts to achieve perfect alignment and accuracy of installation on the job.

One of many reasons why Victor apparatus insulators have such enviable service records is Victor's use of precision-built cast-iron jigs. Here, every insulator is clamped in position to assure accurate alignment. Before shipping, each unit is thoroughly tested mechanically and electrically in accordance with NEMA specifications.

Buy Victor and you're sure of correctly designed, painstakingly manufactured and thoroughly tested insulators of *Purified* Porcelain—finest insulator porcelain ever made!

VICTOR
NO. 729
STACKING UNIT
(TR NO. 140)

Specify

VICTOR PURIFIED PORCELAIN INSULATORS!

VICTOR INSULATORS, INC., VICTOR, N. Y.
SUBSIDIARY OF I-T-E CIRCUIT BREAKER CO.

Low and High Voltage Pintypes • Suspensions • Guy Strains • Spools • Switch and Bus Insulators
Custom Designed Porcelain

HAS YOUR LIGHTING KEPT PACE WITH PROGRESS?

You're always ahead with Sylvania Fluorescent Lamps because of Maintained Brightness

Sylvania's processing technique now enables the interior coating on a Sylvania Fluorescent Lamp to maintain a higher degree of brightness for a longer period of time than ever before. *This longer-lasting brightness represents a bonus of light worth more than the cost of the lamp itself.*

And remember, Sylvania Fluorescent Lamps offer you an assurance of complete satisfaction or your money back.*

* Try 24 Sylvania Fluorescent Lamps of any popular type. If, in your opinion they don't give more light and maintain color and brightness for a longer time than any other brand, send them back with your signed Certificate of Assurance and your money will be refunded.

SYLVANIA

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.

In Canada, Sylvania Electric (Canada) Ltd., University Tower Bldg., St. Catherine St., Montreal, P. Q.

LIGHTING • RADIO • ELECTRONICS • TELEVISION

& Howell Micro-Twin is claimed to have combined for the first time all microfilming functions in a single table-top size unit.

It will record documents up to 11-in. wide and 3,700-ft long, photographing both sides. Mirrors are used to record both sides simultaneously. Recording is 37:1 or 24:1. The dual-purpose lens projects life-sized image of document onto the 8 x 11-in. reader screen. Size is 13½ x 23 x 32 inches.

Burroughs Corp, Detroit 32, Mich.

Photo Printer

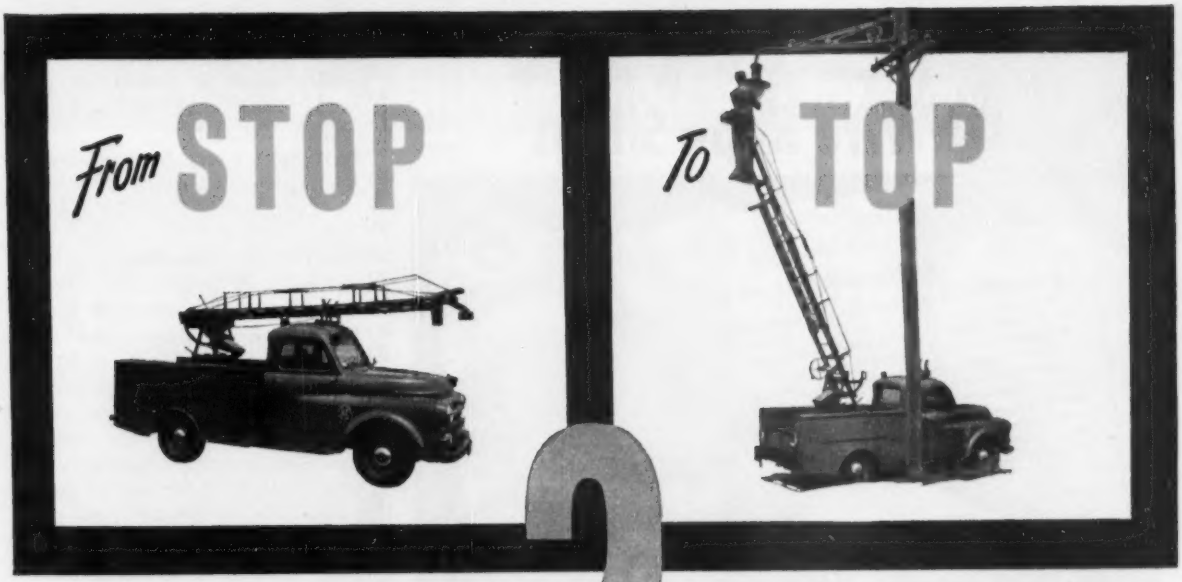
The "legal model" Verifax printer is designed for on-the-spot copying of office papers and documents through the 8½ x 14-in. size. It makes multiple copies by a transfer process. Three positive copies can be made from a matrix paper negative in one minute. The paper compartment holds 100 sheets. Input is 110 v ac.

Eastman Kodak Co, Rochester 4, N. Y.

Whiteprinters

Whiteprinters require reasonably translucent originals. "Dry" development of the exposed paper is in an atmosphere of ammonia.

Office-size whiteprinter . . . The P&H Copymaster can produce 1,000 legal-size copies an hour. Width capacity is 20 inches for cut sheets or roll stock in any length. It operates on 115 v, 60 cps. Synchronized printing and ammonia-dry developing speed is up to 30 fpm. Speed dial control autotically changes temperature in evapo-



IN 3 EASY STEPS

with the Murray Crows'nest

REGISTERED TRADE MARK

1

JUST A SLIGHT PRESSURE

Pull out the handle, press down. That's all that's needed to release ladder from riding position and raise it to the desired inclination. Husky spring action does most of the work. Release handle to lock the ladder.

2

ROTATE

Release locking arrangement. Rotate full 360° easily —there is a handle on each side for convenience. Murray's exclusive semi-automatic mechanism thruout insures complete safety.

3

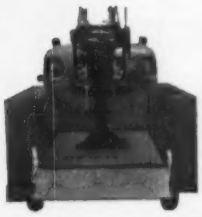
EXTEND

Because of large drum, only a few turns on the windlass are necessary to extend upper section of ladder. The 24" long flat floor of the platform is adjustable to suit any of the inclinations—30° to 72°

LEAVES PLENTY OF FLOOR SPACE

Even on low priced pick-up trucks, the Murray Crows'nest leaves the absolute maximum in standing and loading space. Rotation at 37½" is above usual height of cabinets.

In the riding position, the Murray Crows'nest snuggles close to the top of the cab. Low center of gravity keeps the truck in good balance.



Your men can do more jobs per day because operation of the Murray Crows'nest is quicker, easier and less fatiguing. Each of the steps — inclination, rotation and extension — is easy-flowing and effortless. The reason is simple — Murray engineers have designed the Crows'nest to do most of the work itself. Every part is in perfect balance so that only a slight pressure is needed to start each action.

MURRAY MANUFACTURING CORPORATION
1250 Atlantic Avenue, Brooklyn 16, N. Y.

Send specifications, drawings, mounting instructions and quote on:

29'..... 32'9..... 36'8.....
Pedestal Style Crows'nest

NAME.....

TITLE.....

COMPANY.....

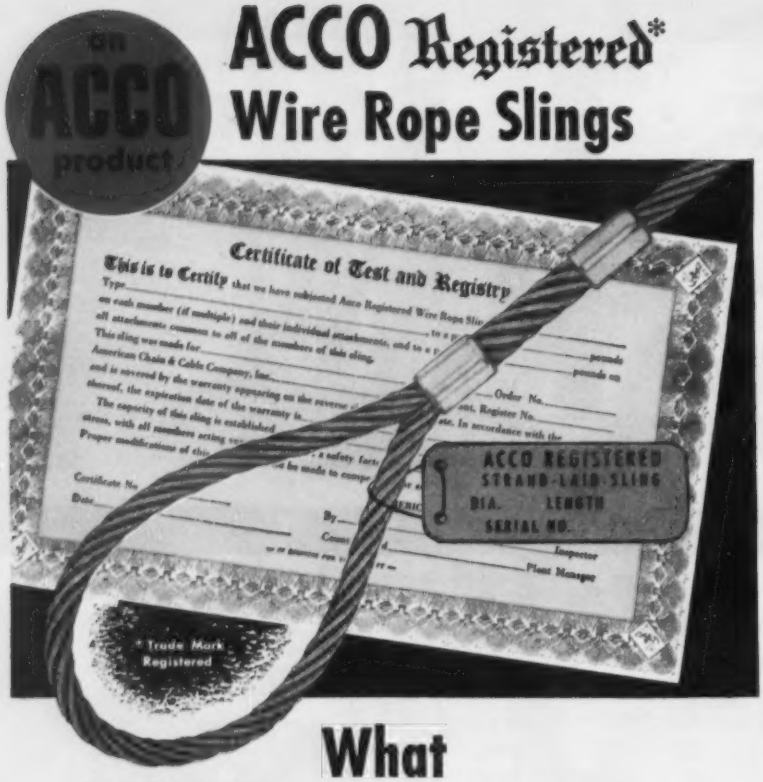
ADDRESS.....

.....

Murray

MURRAY MANUFACTURING CORPORATION
1250 Atlantic Avenue, Brooklyn 16, New York

Service Entrance and Meter Equipment • Magnetic Hydraulic Circuit Breakers
Safety Switches (Types A, C & D). • Current Limiting Reactors • Utility Specialties



What ACCO Registered Means

• Primarily it means greater safety for your men and machines when loads are carried in the air in your shop. It means insurance against dropping a load which could tie up production.

But that's only part of the story. The name ACCO *Registered* on the slings you use means greater efficiency because of better design of endings and attachments. It means lower overall sling costs because every part of every ACCO *Registered* Wire Rope Sling has the same strength as the catalog breaking strength of the rope itself. ACCO even magnafluxes each hook to make doubly sure it will serve you well.

And it means that the sling has been proof-tested at the factory to twice its rated capacity. You can be sure that every ACCO *Registered* Wire Rope Sling is the safest, strongest and lowest cost lifting tool you have ever used.

Best of all, you can get them when you need them from a nearby stock. Contact your ACCO *Registered* distributor today for full information and prices. Or, write our Wilkes-Barre, Pa., office.

1. The best material
2. Unit safety factor (on bodies, rings, links, safety shackles, hooks)
3. Proof test of complete sling to twice rated capacity
4. Actual field service test of each model
5. Metal identification tag on each sling
6. Signed Registry Certificate with each sling

ACCO

TRADE MARK

Wire Rope Sling Department
AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.
In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

Links Shackles Hooks

rating chamber, assuring full development. The floor models have storage compartments at bottom for paper stock. Floor space used is 5 sq ft. (Bulletin 54C5)
P&H Sales Corp, 5640 N. Western Ave., Chicago 45, Ill.

High-capacity whiteprinter . . . Model 800 whiteprint machine will reproduce copy up to 42-in. wide at speeds up to 30 fpm. An electronic speed drive permits speeds from 8 in. to 30 fpm. The dry development section has thermostat control to maintain desired temperature. A wattage stabilizer maintains constant printing speeds by compensating for voltage fluctuations within the 200-240 range.

A rear stacking device and constant torque motor to take up roll stock are optional. (Folder available)
Ozalid, Johnson City, N. Y.

High-production whiteprinter . . . Fully automatic, high production whiteprint machine, the Pease Challenger, has printer and developer synchronized to a maximum speed of 40 fpm. It is a "one-step" feed machine, using an automatic tracing separation feature. The light source is a GE 4,000-w high-pressure mercury-vapor lamp with a constant-wattage transformer. Full strength ammonia is used for developing. A front or rear automatic windup device is optional for continuous yardage operation. An 8½ x 11-in. tracing is returned to the operator in 2½ sec and the finished whiteprint in 6½ sec. Paper up to 42-in. wide is accommodated. (Ask for Form 2514)
C. F. Pease Co, 2601 W. Irving Park Rd, Chicago 18, Ill.

Spirit Duplicator

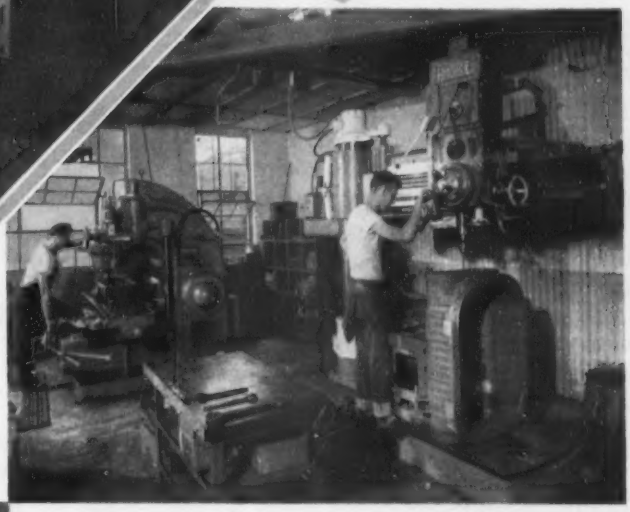
Model A-44 All-Star automatic-feed spirit duplicator has positive feed mechanism to insure wrinkle-free copies. Pinpoint registration of copy is claimed, essential in forms and systems work. Patented moistening unit is said to eliminate adjustments and flooding, giving perfect copies from the very first sheet and longer master life.
Duplicopy Co, 224 W. Illinois St, Chicago 10, Ill.

(*More New Equipment on page* 216)

Visit the Machine Shop in Our Factory!

No. 3 in a series of pictorial tours thru the Nelson Plant showing Nelson Electrical Equipment "in the making".

MACHINING EXPLOSION-PROOF CASTINGS is illustrated in photograph appearing below. Machinist at left is milling enclosure for Nelson pipe line sampler. Machinist at right is drilling holes required for installing sealing hood on 50,000 A.I.C. explosion-proof air circuit breaker.



SKILLED CRAFTSMEN MAKE COMPONENT PARTS for Nelson Motor controls, switchgear, circuit breakers and electrical specialties in the section of the Nelson Machine Shop shown above.

FITTING UP CONDUIT RUN to Nelson explosion-proof combination motor starter on Nelson Switchrack is illustrated in photograph at right.

NELSON LIGHTING PANELS & JUNCTION BOXES are assembled in Machine Shop area shown at left. Bus supports, starter reset buttons and breaker operating handles are installed here.

NELSON *Electric* MANUFACTURING CO.
TULSA, OKLAHOMA

MANUFACTURERS OF:
Motor Starters • Circuit Breakers • Lighting Panels and Junction Boxes in water-tight, dust-tight and explosion-proof enclosures • Instrument and Control Panels • Switchgear and Unit Substations • "Control" Motor Control Centers • "Nelex" Mineral Insulated Heater Units

The instrument that put electronics to work

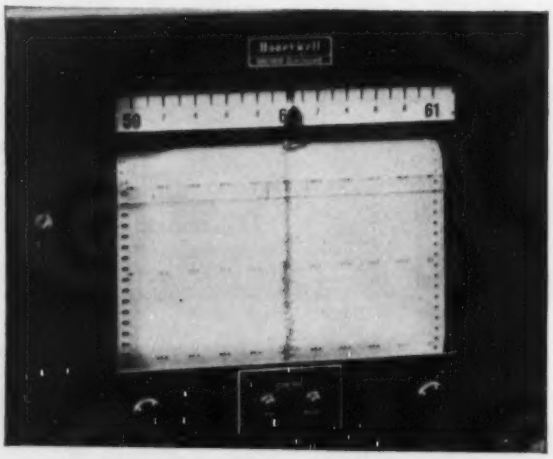
Before electronics came into the picture, industrial instrumentation was caught in a squeeze. On one hand, it was besieged with demands by production men and engineers for higher sensitivity, faster speeds, and greater reliability. And on the other hand, it was hampered by the limitations of mechanical devices. For the instruments of fourteen years ago were merely mechanical imitations of a man watching a galvanometer needle and twiddling dials. They were too delicate . . . too sensitive to vibration . . . too easily led astray by wear or maladjustment. They just couldn't deliver the performance that new production methods required.

In 1940, however, came a major milestone in the progress of instrumentation—development of the *ElectroniK* potentiometer. This was not only a new kind of instrument. It was a new concept of measurement. For the first time, it applied the science of electronics in a practical way to the design of a measuring device for industry. It replaced complicated, fragile mechanical gadgets with a simple but sensitive electronic circuit and servo system . . . the "Continuous Balance" principle of measurement.

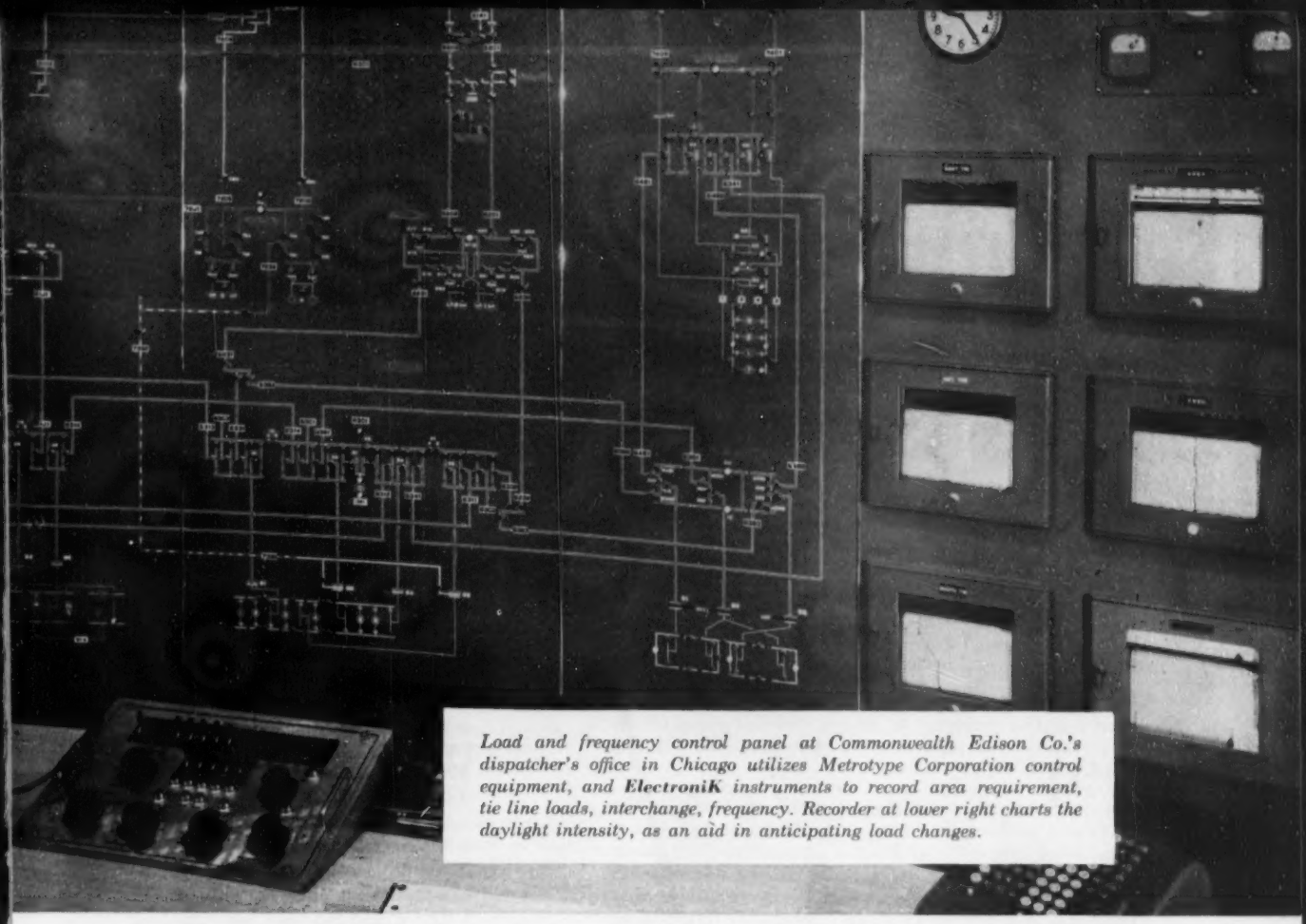
You could tell it was something new when you opened up the *ElectroniK* instrument's case. There was no sign of whirring gears, levers and cams. You could tell it was giving a new kind of performance in measurement, too, by the way the pointer would move swiftly and surely in one smooth sweep whenever the measured variable changed.

The *ElectroniK* instrument gained quick acceptance by production men, engineers, research technicians and maintenance men. They liked the way it provided laboratory accuracy and sensitivity, week after week, under the toughest industrial service conditions. They found that its speed and precision made possible improvements in product quality and process operation that had been unattainable before. And they have proved their confidence by ordering and reordering *ElectroniK* instruments by the thousands . . . not solely because it was *first* of its kind, but because it has continued to be the *best* in performance.

ElectroniK instruments play vital part in *all-electronic*



"Continuous Balance" principle of measurement, pioneered in ElectroniK instruments, affords the precision, speed and dependability demanded by modern system control.



Load and frequency control panel at Commonwealth Edison Co.'s dispatcher's office in Chicago utilizes Metrotype Corporation control equipment, and ***ElectroniK*** *instruments to record area requirement, tie line loads, interchange, frequency. Recorder at lower right charts the daylight intensity, as an aid in anticipating load changes.*

load and frequency control

WITH THE installation of the control instrumentation pictured above, load dispatching at the Commonwealth Edison Co. has taken another step forward. This modern, fully electronic equipment concentrates at the load dispatcher's fingertips all the data he needs to supervise interchange between systems . . and the means for its automatic control.

Integrated into an electronic load frequency control system are a number of *ElectroniK* instruments, which perform diversified functions essential to control of tie line loads and system frequency. Operating in conjunction with existing mechanical type instruments, *ElectroniK* instruments measure and record individual tie line loads, net loads on east and south ties, net area interchange, and frequency. By feeding accurate data into the control equipment, they contribute greatly to the precision and dependability of system regulation.

In utilities throughout the country, the precision and versatility of *ElectroniK* instruments are proving invaluable in a wide variety of measuring and controlling problems. Their simple, rugged design has enabled them to set high standards for continuity of service.

Your nearby Honeywell sales engineer will be glad to discuss your specific applications for *ElectroniK* instruments. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● **REFERENCE DATA:** Write for Catalog 90-2, "Supervisory Instrumentation for Power Generation," and for Catalog 9050, "Supervisory Instrumentation for Steam Generation."

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

R T & E *transformers are guaranteed for* FIVE YEARS, AS PROOF OF THEIR DEPENDABILITY

WHY FIVE YEARS?

Because we at R T & E feel that paint, gaskets, oil, etc. regardless of quality, will normally withstand averag conditions over the usual one year guarantee perio

And because we want to assure our customers of t fine quality and workmanship that goes into R T & E products.

Yes, a five-year guarantee is quite contrary to the standard practice in the transformer industry. And it is possible only because R T & E goes beyond the usual industry requirements from its advanced engineering right on through its precision quality-controlled production. You will find these **extra** ingredients reflected in the longer life and years of improved, trouble-free service—the established performance record of R T & E products.

WRITE FOR CATALOG

R T & E Co.
WAUKESHA WISCONSIN

Diazo Copy Machine

Tabletop direct reproduction machine, Copyflex Series 100 model, is designed for the engineering, drafting, and architectural fields. Operating speed is 12 fpm and printing width is 11 in. The self-contained unit is based on the diazo direct photochemical copying process. Positive copies are made from originals on translucent paper. Input is 115 v.
Charles Bruning Co, Inc, 4700 Montrose Ave, Chicago 41, Ill.

MORE NEW PRODUCTS
about which you should know

Weller Electric Corp., 808 Packer St, Easton, Pa. has low-cost junior **soldering gun,** Model 8100, rated over 100 w . . . Motor Generator Corp, Hobart Sq, Troy, Ohio has motor-generator for **frequency changers** to convert 60 cps into 180 or 360 cps power for operating high-cycle tools. Ratings are 5, 7.5, 10, and 15 kw.

Mechanical Products, Inc, 1800 River St, Jackson, Mich. has Mini-Breaker **circuit protector** rated 4, 4½ 5, 5½, 6, and 7½ amp, with standard Edison screw base . . . Sprague Electric Co, 315 Marshall St, North Adams, Mass. has Tantalex tiny electrolytic **capacitors** employing tantalum anodes, designed for low-voltage transistor circuits (Engineering Bulletin 352).

Pyle-National Co, 1344 N. Kostner Ave, Chicago 51, Ill. has line of **circuit breakers** and **motor-starting switches** for hazardous locations. Circuit breakers are rated up to 30 amp, 120 v ac. Motor starters are rated up to 1 hp . . . G-V Controls Inc, 28 Hollywood Plaza, East Orange, N. J has hermetically sealed adjustable **thermostat,** C8 series, —100 to 300 F. Repetitive accuracy and differential is 1 deg. Contacts are rated 5 amp, 115 v ac. Size is ½ diam x ¾-in.; weight, 0.004 lb.

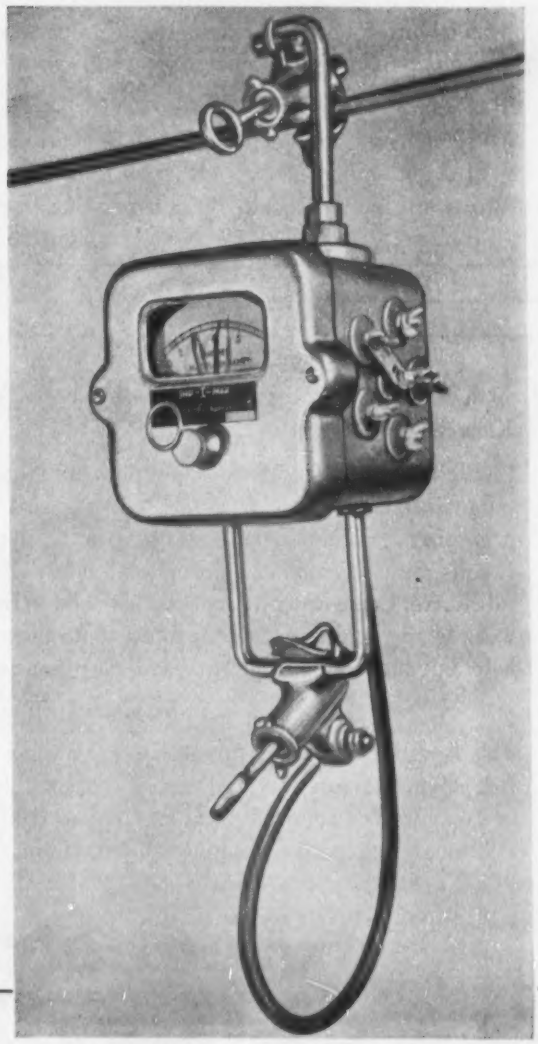
Barry Corp, Watertown, Mass. has LM7 self-leveling machinery mount and **vibration isolator** rated 10,000 lb . . . Condamatic Co, 332 W. 21 St, New York has Hydralink reusable **couplings** for low-pressure hydraulic systems (Catalog 600).

NEW*

A "HOT LINE" LOAD CHECKING MAXIMUM DEMAND THERMAL *Ammeter*

HD IND-I-MAX

for checking primary loads



- ✓ Combines Current Transformer and Lincoln Thermal Ammeter in weatherproof aluminum housing
- ✓ Can be mounted on a conductor with a standard Hot Line Stick
- ✓ Multi-Ratio—10 ratios measure 0-60 amperes
- ✓ Total weight less than 10 lbs.
- ✓ Inexpensive
- ✓ No interruption of load current necessary to check amperage
- ✓ Uses all purpose clamps

• For checking loads specify HD ELECTRIC IND-I-MAX and MAX-I-METER. Send for *Bulletin 11M54.*

HD ELECTRIC COMPANY • DEERFIELD, ILL.

Kennecott's new adequate

and what it means to the Public Utility!

Few things are more important to Mr. and Mrs. Homeowner than the way their house is powered. He and she depend, as never before, upon a whole houseful of appliances. These electrical servants, in turn, must be fed plenty of power to operate smoothly at their full, built-in strength.

Yet, today, more than 80% of all the homes in America are underpowered! Not, as you well know, because *you* haven't the power to spare. But simply because the wiring in these homes just can't take it. Wires are too small, circuits too few to carry the needed load. It's a real, serious bottleneck in your business. You know it. So does Kennecott.

That's the reason for Kennecott's new national adequate wiring campaign in the Saturday Evening Post and This Week magazines. It's a drive that's bound to benefit *everyone* in the electrical industry. Because it sells the convenience, comfort and safety of full-powered wiring to millions of homeowners... teaches them how to recognize the symptoms of weak wiring and exactly what to do about them. Such education cannot help but build consumption of current, increase sales of appliances!

Tie-in With Us!

This is an industry-wide promotion. Let's work together for its success. Ask about reprints for mailings, poster-size blow-ups for display and newspaper mats for your local campaigns. Address letter to Carl Lenz, President, Kennecott Sales Corporation, 161 E. 42nd St., N. Y. 17, N. Y.

Kennecott
COPPER CORPORATION

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wiring campaign.....

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THREE CHEERS!
Her broiler just broiled a crisp, juicy steak!
Isn't it do that before?
HOORAY!
Now his TV set always shows full-sized, pictures!
Why couldn't it do that before?
They're showing old-fashioned Tickers in so many homes these days!
Kennecott

5000 WD

the New

YORK-HOOVER TWO-MAN LINE BODY

model 5000 WD is a sound investment for YOU...

because it will do your line work *at less cost—quicker* and *safer.*

With complete equipment it will dig the hole and set the pole, normally in a matter of minutes, all within full view and control of the truck operator.

Backed by 61 years' experience and embodying skillful engineering and honest workmanship, the model 5000 WD body with equipment represents a truly outstanding investment.

Before you purchase any line equipment, make sure you have thoroughly looked into this modern, up-to-the-minute unit by York-Hoover.

GET THE FACTS! Write for Bulletin No. 931 today.

York-Hoover Corporation
YORK, PENNSYLVANIA
Body Division

CATALOGS • BULLETINS

● **SWITCHES:** Catalog 101, 20 pages, covers 258 different switches, actuators, and enclosures. Microswitch, Minneapolis-Honeywell Regulator Co, Freeport, Ill.

● **RECTIFIERS:** Bulletin 554, 8 pages, covers rectifiers with manual control or automatic regulation for the electrochemical industry. Crown Chemical & Engineering Co, 4722 Worth St, Los Angeles 63, Calif.

● **RECTIFIERS:** Catalog 441 (12 pages) covers industrial selenium rectifiers and controls for the metal finishing and electro-chemical industries. American Rectifier Corp, 95 Lafayette St, New York 13, N. Y.

● **TRUCK CHARGERS:** Bulletin 4520 (4 pages) covers industrial truck chargers. Ther Electric & Machine Works, 17 S. Jefferson, Chicago 6, Ill.

● **GERMANIUM DIODES:** Bulletin GD-1A, 4 pages, gives specs on 28 germanium diodes and a replacement guide listing RETMA types. International Rectifier Corp, 1521 E. Grand Ave, El Segundo, Calif.

● **PHOTOCELLS:** Bulletin PC-10 (4 pages) covers cadmium-sulfide crystal photocells. Standard Piezo Co, Carlisle, Pa.

● **LUMINOUS-TUBE TRANSFORMERS:** GEA 5859C, 8 pages, describes luminous-tube transformers for indoor and outdoor applications. General Electric Co, 1 River Rd, Schenectady 5, N. Y.

● **FLUORESCENT LIGHTING:** Fluorescent Lighting Guide Book, 24 pages, gives complete information on fluorescent lighting, lamps, and parts. Sylvania Electric Products, Inc, 1740 Broadway, New York 19, N. Y.

● **STAGE LIGHTING:** Bulletin ES-54 (12 pages) covers a simplified lighting system for school stages. Hub Electric Co, 2255 W. Grand Ave, Chicago 12, Ill.

● **HOME LAMPS:** A 4-page catalog shows portable lamps. A catalog sheet shows outdoor lamps for lawn and garden. Standard Novelty & Lamp Co, 823 S. Wabash Ave, Chicago 5, Ill.

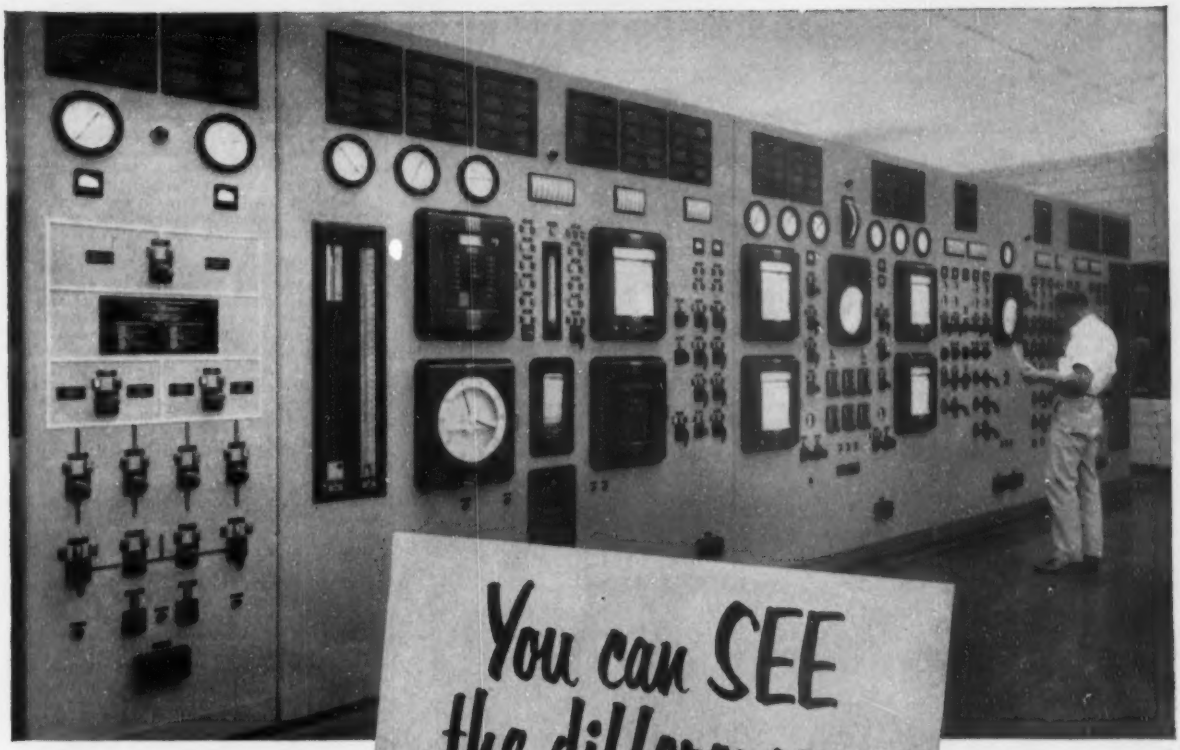
● **HOME HEATING:** An 8-page catalog shows electrical home heating units. Electrovector, Inc, 1660 E. New York Ave, Brooklyn 12, N. Y.

● **INSTRUMENTATION:** A 24-page booklet shows typical uses of company's instruments: data processing, dynamic recording, stresses, strains, pressures, etc. Consolidated Engineering Corp, 300 N. Sierra Madre Villa, Pasadena 15, Calif.

● **HEAT TEST CHAMBER:** A 4-page bulletin describes Model TC-2 temperature test chamber, -65 to 350 F, 600 cu in. load volume, uses 500 w heater or 15 lb dry ice. Statham Development Corp, 12411 W. Olympic Blvd, Los Angeles 64, Calif.

● **TELEMETER:** Bulletin M1710 (44 pages) describes Metameter telemeters for remote measurement, recording, and automatic control of pressure, flow, power, etc, and operable over telephone, carrier, or radio circuits. The Bristol Co, Waterbury 20, Conn.

● **HOOK-ON RECORDER:** Hook-on Recording Volt-Ammeter, Type CF-7 (GEA-6104A, 12 pages) describes a weatherproof, 30-day recorder having 7 working ranges, 15-750 amp, 150-750 v ac. General Electric Co, 1 River Rd, Schenectady 5, N. Y.



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L+N complete panels serve the needs of your operating personnel. Each panel is designed and custom-built to your requirements. Instruments and controls are arranged in a functional pattern for easy reading . . . assist in reducing fuel costs and operating errors.

L+N complete panels save time and costs for your panel installation. We completely assemble each panel in our plant, with all instruments in place, double-checked and tested. You receive panels ready to go when connected to primary elements and control devices.

L+N complete panels solve your panel engineering and design problems. Our panel engineers convert your requirements for control of boiler, turbine and auxiliary equipment into a functional layout for your approval. From this layout we prepare the electrical and piping diagrams and the final steelwork drawings. You receive prints of these drawings as part of our standard panel engineering service.

***Let an L&N panel engineer** study your problems; he'll explain in detail what we can do for your particular plant. Our fifteen years in building panels for many utilities assures you of* effective service. *Write to Leeds & Northrup Company, 4938 Stenton Avenue, Philadelphia 44, Pa.*

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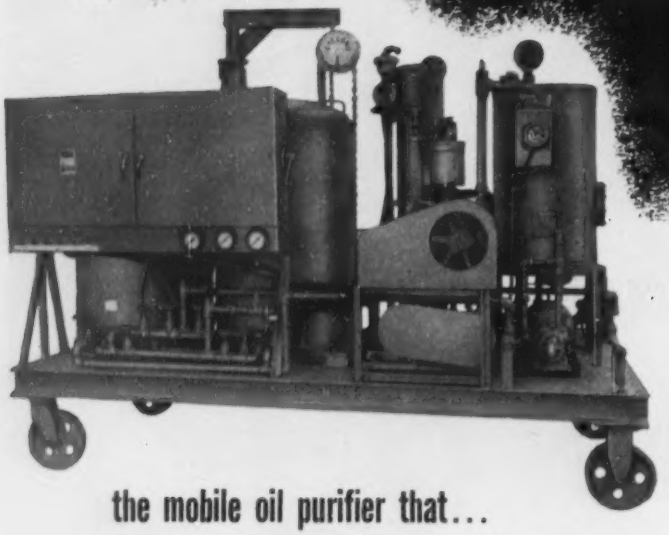

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2. Operates in the field (without taking electrical equipment out of service) or at a central station.
3. Eliminates costly transformer cleaning operations . . . restores color, neutralization number and dielectric strength of oil.
4. Extends useful life of oil . . . reduces power failures and equipment damage.
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TECHNICAL LITERATURE

LABORATORY GLASS—Catalog 53A (12 pages) covers glass products for industry; application data tables give dimensions, weights, wall thicknesses for glass tubing and rod, capillary tubes, low pressure gauge tubes, oil cup cylinders, glass wool fiber used in filtration processes, and scientific apparatus. Friedrich & Dimmock, Inc, Lincoln Ave, Millville, N. J.

EPOXY RESINS—Three 6-page bulletins cover Bakelite C-8 epoxy resins and hardeners for use in tooling, casting, laminating, potting, encapsulating, embedding, and adhesive applications. Technical Bulletins 1, 2, and 3 cover C-8 epoxy resins BR-18774, BR-18795, and BR-18794, respectively. Bakelite Co, Union Carbide and Carbon Corp, 300 Madison Ave, New York 17, N. Y.

EXPANDABLE POLYSTYRENE—Bulletin C-4-204 (24 pages) covers a new foam material, expandable polystyrene. Supplied granulated, it expands in molds to a foam having a density of 2 to 10 lb/cu ft. Koppers Co, Inc, Chemical Div, Koppers Bldg, Pittsburgh 19, Pa.

COLD GALVANIZATION — Galvicon, A Process of Cold Galvanization by Brush, Spray or Dip Method, 10 pages, covers protection of iron and steel surfaces by a 96% coating of zinc, offering cathodic protection. Galvicon Corp, 40 W. 29 St, New York 1, N. Y.

POLYETHYLENE WIRE — Kabelitems for June, 1954 (No. 72) 6 pages, covers the burning characteristics of polyethylene-covered line wire compared to other types. Bakelite Co, Union Carbide and Carbon Corp, 30 E. 42 St, New York 17, N. Y.

BERYLLIUM COPPER STRIP — Data Sheet 300 (4 pages) covers beryllium copper alloys supplied as strip, engineering properties, heat-treating, and tempers. Industrial Div, American Silver Co, Inc, 36-07 Prince St, Flushing 54, N. Y.

CARBON BRUSHES—Carbon Brushes for Electrical Machines, Their History, Properties and Applications (16 pages) is intended to familiarize the public and users with the importance, applications, types, materials, properties, characteristics, care, and selection of carbon brushes. Price, $1.00. Carbon Section, National Electrical Manufacturers Assn, 155 W. 44 St, New York 17, N. Y.

TUNGSTEN—A 20 page pamphlet (NP-243) illustrates the production of tungsten, from the ore to the finished products: welding electrodes, plated wires, filament wire, etc. Physical properties are included. Sylvania Electric Products Inc, 1740 Broadway, New York 19, N. Y.

ALUMINUM wall chart shows conversion from old designation to new Aluminum Association designations (effective October 1). Kaiser Aluminum & Chemical Sales, Inc, 1924 Broadway, Oakland 12, Calif.

STAINLESS STEEL—Bulletin TDC-147 (4 pages) gives helpful hints on hand threading of stainless steel and tubing. Babcock & Wilcox Co, Beaver Falls, Pa.

WATER SUPPLY—Manual of Water Supply and Equipment (80 pages) covers everything the dealer should know about installation and servicing. Complete hydraulic and mechanical data is included. Price, $1.50. Plumbing and Heating Industries Bureau, 35 East Wacker Dr, Chicago 1, Ill.

SIMPLIFIED FENCE PAINTING (4 pages) gives suggestions on painting industrial chain link fences. Subox, Inc, Fairmount Plant, Hackensack, N. J.

DUXSEAL®
plugs 'em quick and tight

DUXSEAL is a non-hardening adhesive plastic compound made with an asbestos base. It is the ideal general utility sealing and caulking compound for duct openings, potheads, bushings, terminal boxes, and for filling multi-wire contact boxes indoors. Use it like putty, just as it comes from the handy package, for smooth, workmanlike jobs.

Duxseal stays plastic—will not slump, melt or run under ordinary temperatures. Clings to duct walls and cables but flexes with expansion and contraction. It is unaffected by water and gases, does not react with rubber, metals or painted surfaces. For full information write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ontario.

JM

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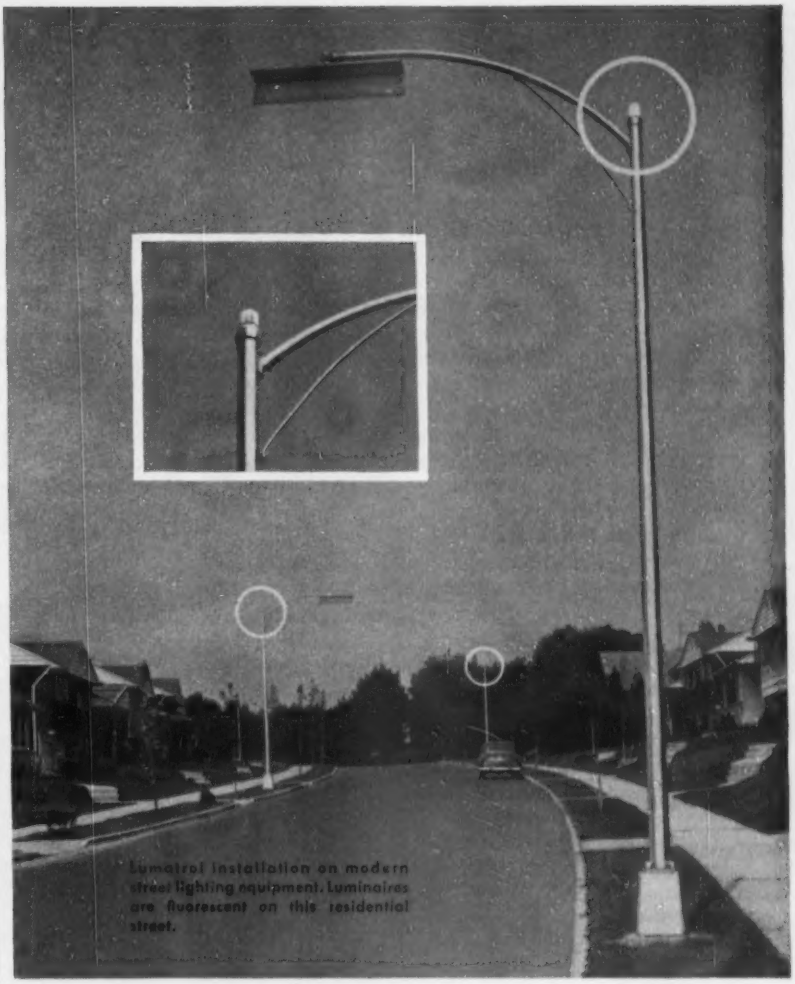

Lumatrol installation on modern street lighting equipment. Luminaires are fluorescent on this residential street.

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photoelectric light switch.....

. . . the new, simple method of *fully* automatic light control

. . . the low-cost, plug-in unit that's easy to install, easy to maintain

. . . the light switch that stays on the job year after year regardless of weather

. . . the small-size switch that's easily adaptable to any pole or luminaire, *PRODUCING WELCOME ECONOMIES WHEREVER INSTALLED*

. . . LUMATROL RATES FIRST ON ALL TWELVE SPECIFICATIONS NORMALLY APPLIED TO THIS TYPE CONTROL . . .

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LETTERS TO THE EDITOR

Listen to the Voice of Experience

To the Editor:

I agree, It's a Grass Roots Job (EW, June 28, p 85).

The groups you mention in your editorial and others are finding out that while they may set up and finance campaigns at the national level, they do not function without local cooperation and promotion.

Outstanding examples are NEMA's Electric Housewares Campaigns and EEI's Major Appliance Promotions. Since they have been put out to the Leagues, who have secured local cooperation, they have been much more effective and successful.

True, the utilities are the logical and natural source to bring the local groups together, providing of course that they understand their responsibility and what is good for the industry. Every utility area can afford a League and would be much better off for it.

Our own Institute or League is an example. Originally, we included five utilities in Metropolitan Boston—now we have expanded to all of eastern Massachusetts with 13 companies and several municipals. This came about from the utility companies realizing their responsibility and their willingness to cooperate and promote with the other branches of the industry.

This Grass Roots Job, like the one on Adequate Wiring, needs plenty of follow up. Your editorials have been effective, and I trust you will keep up the good work.

John G. Waddell
Managing Director

Electric Institute of Boston, Inc
80 Boylston Street
Boston 16, Mass.

Making Some Progress in Illinois

To the Editor:

We have read with interest the lead editorial in the June 28, 1954 issue of Electrical World.

We agree that much can be done on the local level to increase the interest of the different segments of the electrical industry. Whether or not it requires another association or local league I am not sure. We think we are making some progress working with dealers, contractors, and others without additional organizations. Time will tell.

R. K. Dallas
Vice President

Central Illinois Light Co
Peoria, Illinois

To Go It Alone Is Impossible

To the Editor:

All of us who are in Association work are indebted to you for the splendid editorial, "It's a Grass Roots Job."

There is no question about the soundness of your logic, and your message will undoubtedly be helpful in reawakening the interest and support of members who may have grown to take us for granted.

The place where your editorial will do the greatest good, however, is in those areas where it may stimulate the development of cooperative activity for the first time. No one company or branch of the industry is big enough to "Go It Alone," at least not and make anywhere near the progress that it would through cooperation with the rest of the industry.

We use a slogan—it isn't original with us, in fact don't know where it did originate, but it is right to the point—"Associations accomplish those things which most people think just happen."

Again, thanks for giving cooperative activities a boost.

Victor W. Hartley
Managing Director

Pacific Coast Electrical Association,
530 West Sixth Street
Los Angeles 14, Calif.

Too Much Credit for Arkansas

To the Editor:

The attractive cover on your July 12 issue carries the caption, "Microwave Usage Reaches New High in Arkansas." But Bill Brewer's article in the magazine brings out that only one of the stations is in Arkansas, that at Pine Bluff. The others are in Louisiana and Mississippi. I don't think that you need to feel badly about my making that statement, but rather than saying Arkansas wouldn't it have been more accurate to say Middle South?

W. L. Rush
T&D Engineer

Louisiana Power & Light Co
142 Delaronde Street
New Orleans 14, La.

• It's letters like this that make our editorial faces red. Most certainly the cover as well as the story should have given credit to the entire Middle South System for its excellent installation.

Too Little Faith

To the Editor:

The July 12 editorial "Give the Customer What He Wants", certainly hit the nail on the head. How much longer is the electric utility industry as a whole going to continue to operate its power systems for the benefit that it can give to them, rather than what the customer wants and has the right to expect from the service? . . .

. . . There are too many people of too little faith in the future in the electric utilities industry always looking behind the corners and under the beds for bogy men. The sooner they realize that there is an almost limitless market in the home for the use of their services, the better off they will be.

S. R. Finley
General Superintendent

Electric Power Board of Chattanooga
Chattanooga, Tenn.

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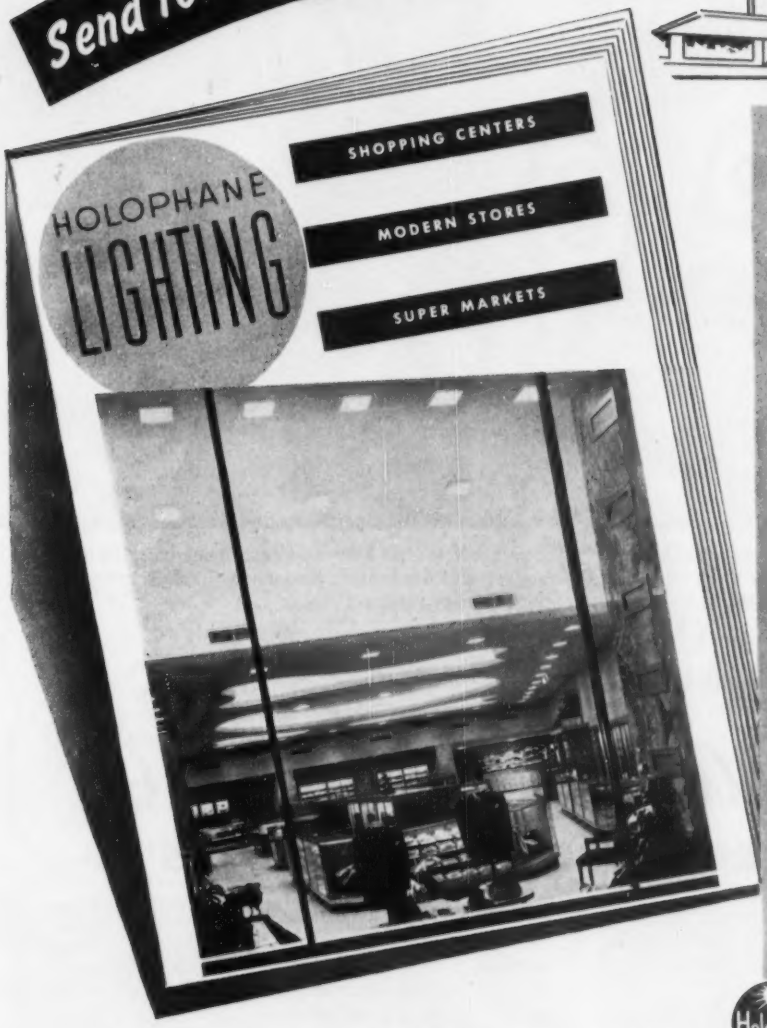

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Coat Shop
Color
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Door Lighting
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Economic Analysis
Elevator Entrance
Escalators
Equipment Index
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Furniture Store
Fur Stores
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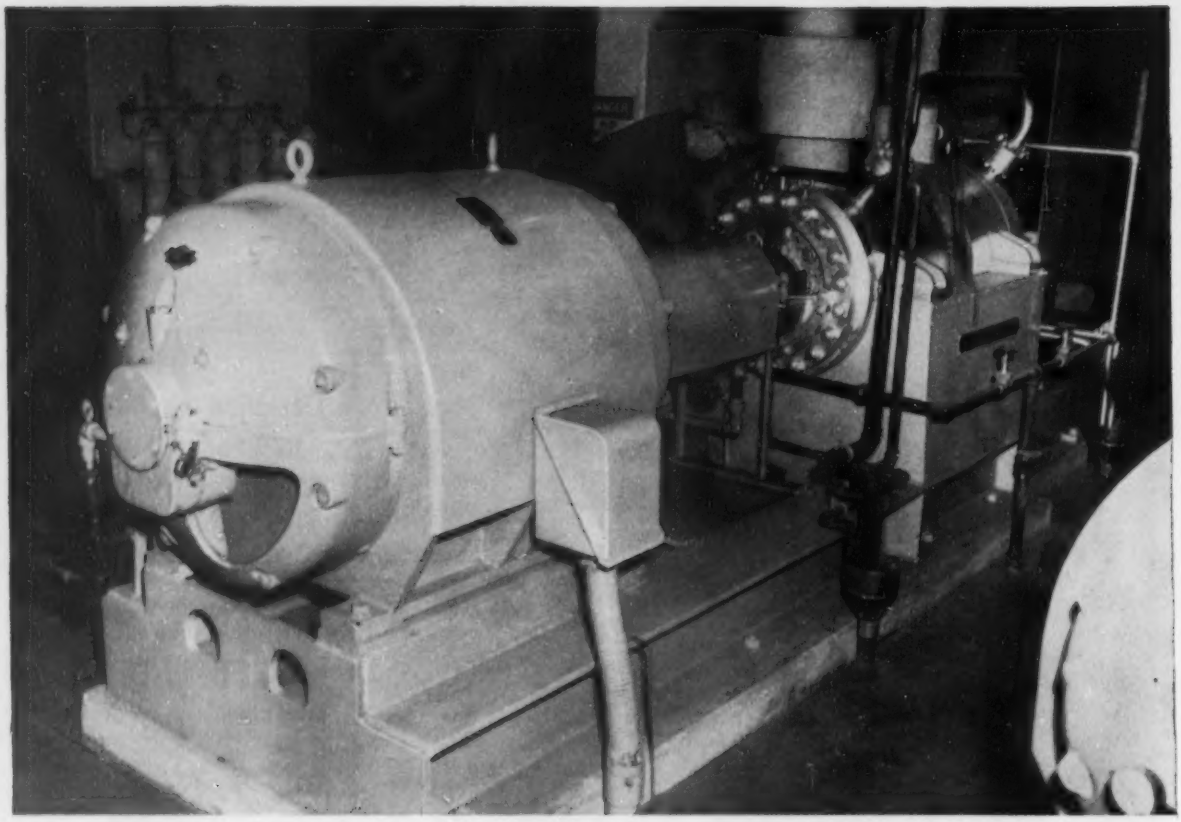


"Here is a 1000 hp, 3600 rpm E-M Induction Motor," says Pete Powerhouse, E-M auxiliary drive specialist, "driving a feedwater pump for a large utility. This motor can take it. We use Kolene-processed bearings, the most rugged and dependable type you can specify for tough 2-pole motor service."

Pete Powerhouse says...

"Dependable Service

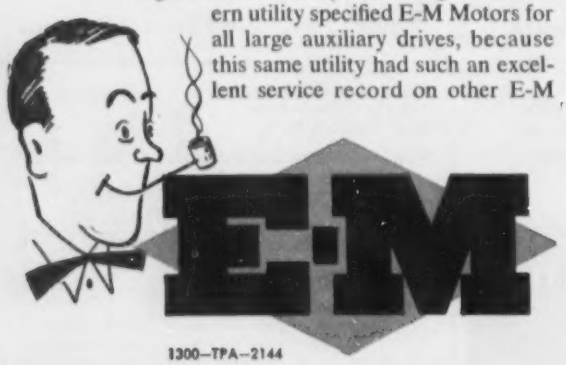
SOLD THESE POWER PLANT MOTORS"

● "I'm Pete Powerhouse, E-M auxiliary drive specialist. My business is motors in the powerhouse class, extra rugged for the gruelling demands of utility operations.

"I was glad to see recently that a large midwestern utility specified E-M Motors for all large auxiliary drives, because this same utility had such an excellent service record on other E-M Motors in their various plants.

"We consider extra dependability like this a trademark of E-M Motors. We at E-M have over 40 years of experience in intensive design and careful construction of large motors.

"Are you considering auxiliary drives? Ask your nearest E-M sales engineer for data, or write us at the factory for E-M Publications 189 and 214. They talk about auxiliary drive motors in detail."



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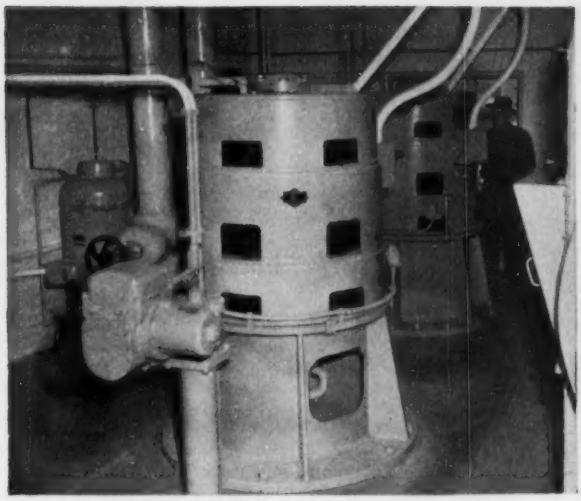
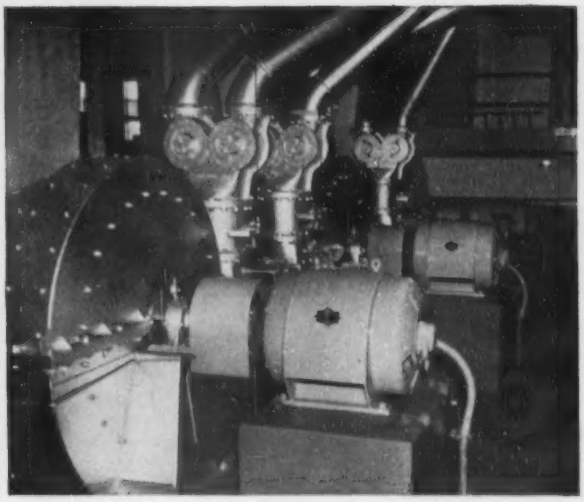
ELECTRIC MACHINERY MFG. COMPANY
Minneapolis 13, Minnesota

Specialists in making motors do
EXACTLY WHAT YOU WANT THEM TO



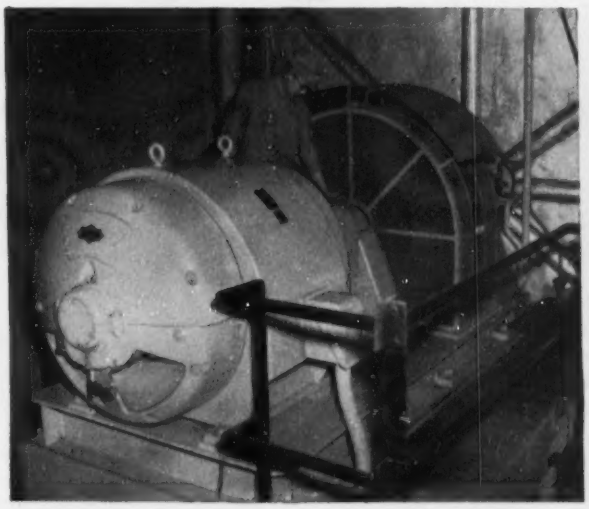


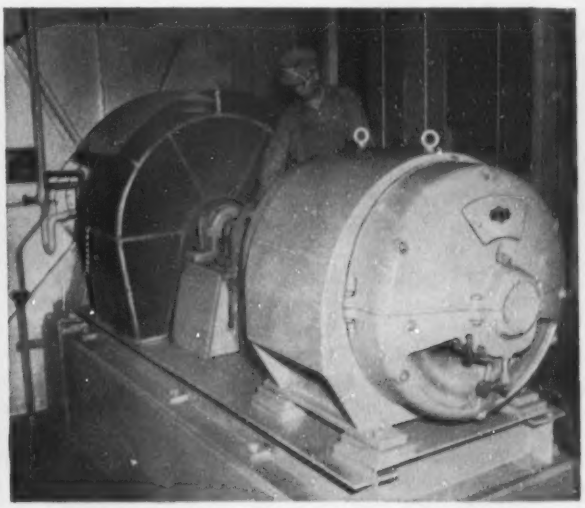
"Pete Powerhouse again. Here are two 150 hp, 495 rpm E-M Induction Motors driving vertical circulating pumps for this utility. Sectionalized frame construction of our Vertical Motors lets you get at core, coils, rotor and bearings in four easy steps. Routine care and maintenance is quick and convenient."

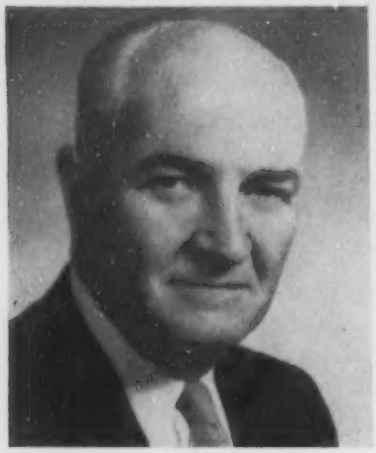
"These three coal pulverizers are driven by three 250 hp, 900 rpm E-M Induction Motors. Extra protection against moisture penetration, high humidity, fumes and harmful dusts is a must on these important drives. We use "Powerhouse" Insulation Treatment to give this vital protection."

"Here's a combination that's hard to beat for driving induced draft fans . . . a 700 hp, 885 rpm E-M Induction Motor and an adjustable-speed E-M Magnetic Drive. Heavy steel E-M Motor frames and enclosures are extra rigid, and pleasing in appearance, with no excessive weight."

"One more to show you. This forced draft fan is driven by a 450 hp, 1180 rpm E-M Induction Motor with an E-M Magnetic Drive to adjust speed. E-M cage construction is practically indestructible. And rugged E-M rotors are balanced precisely for vibration-free operation!"







A. H. PALMATIER

CHARLES W. CALDWELL

Rockland L&P Names 2 VP's

Utility elects as vice presidents A. H. Palmatier and C. W. Caldwell, ex-New Hampshire power official. Manley elevated

Rockland Light & Power Co, Nyack, N. Y., has elected as vice presidents A. H. Palmatier and Charles W. Caldwell, former executive of Exeter & Hampton Electric Co, Exeter, N. H. The utility also appointed Francis E. Manley an assistant vice president, and elected Ralph E. Trower, treasurer since 1948, a director.

Joined Rockland L&P in '20's . . . Palmatier's career with the New York utility started in 1923 when he began working as an appliance salesman. He was promoted to appliance sales manager in 1924 and in 1933 was made general sales manager in charge of all sales and new business operations for the company and its subsidiaries.

Palmatier has been active in committee work for the Edison Electric Institute, Pennsylvania Electric Association, and American Gas Association. He is currently serving on the executive committee of the New York State Farm Electrification Council of State College of Agriculture at Cornell University.

New England Utility Background . . . Caldwell comes to Rockland Light & Power after serving with several New England utilities. He entered the utility field in 1917 when he joined the sales department of Fitchburg (Mass.) Gas & Electric Light Co. He became associated with Beverly (Mass.) Gas & Electric Co in 1924, advancing to sales supervisor four years later. He served as sales manager of Gloucester (Mass.) Electric Co and Gloucester Gas Light Co in 1935. A year later he was appointed assistant manager of Exeter & Hampton Electric. He has since served that utility as general manager, vice president, and a director.

Manley, a graduate of Massachusetts Institute of Technology, joined Rockland Light & Power in 1935. In succeeding years he has been in charge of the acquisition and management of the utility's real estate, general office buildings, and rights-of-way program.

He is presently first chairman of the land and land rights committee of the New Jersey Utilities Association. For 15 years he has been a member of a corresponding committee of the Pennsylvania Electric Association, serving as its chairman for two years.

•

Joel Tompkins has been transferred from his post as chief of the Electrical Division of Aluminum Co of America's Aluminum Research Laboratories at Massena, N. Y., to the central electrical engineering department at Pittsburgh. **Hazen E. House,** who was senior staff engineer of the Power Division at Alcoa's works in Alcoa, Tenn., succeeds Tompkins in the Massena post. Tompkins, an electrical engineer, became affiliated with Alcoa in 1930 and House, also an electrical engineer, joined the company in 1940.

Edward R. Maddock, product manager of condensers, heaters, and ejectors for Worthington Corp since 1953, has been appointed works manager of the firm's Decatur, Ala., works. Maddock, an electrical engineer, succeeds George P. Passmore, who resumes his duties as assistant to the vice president in charge of manufacturing. Maddock joined Worthington in 1936 as a test engineer.

Walter G. McKie, general sales manager of Rochester (N. Y.) Gas & Electric Corp, has been named chairman of the home lighting education committee of the Better Light Better Sight Bureau.

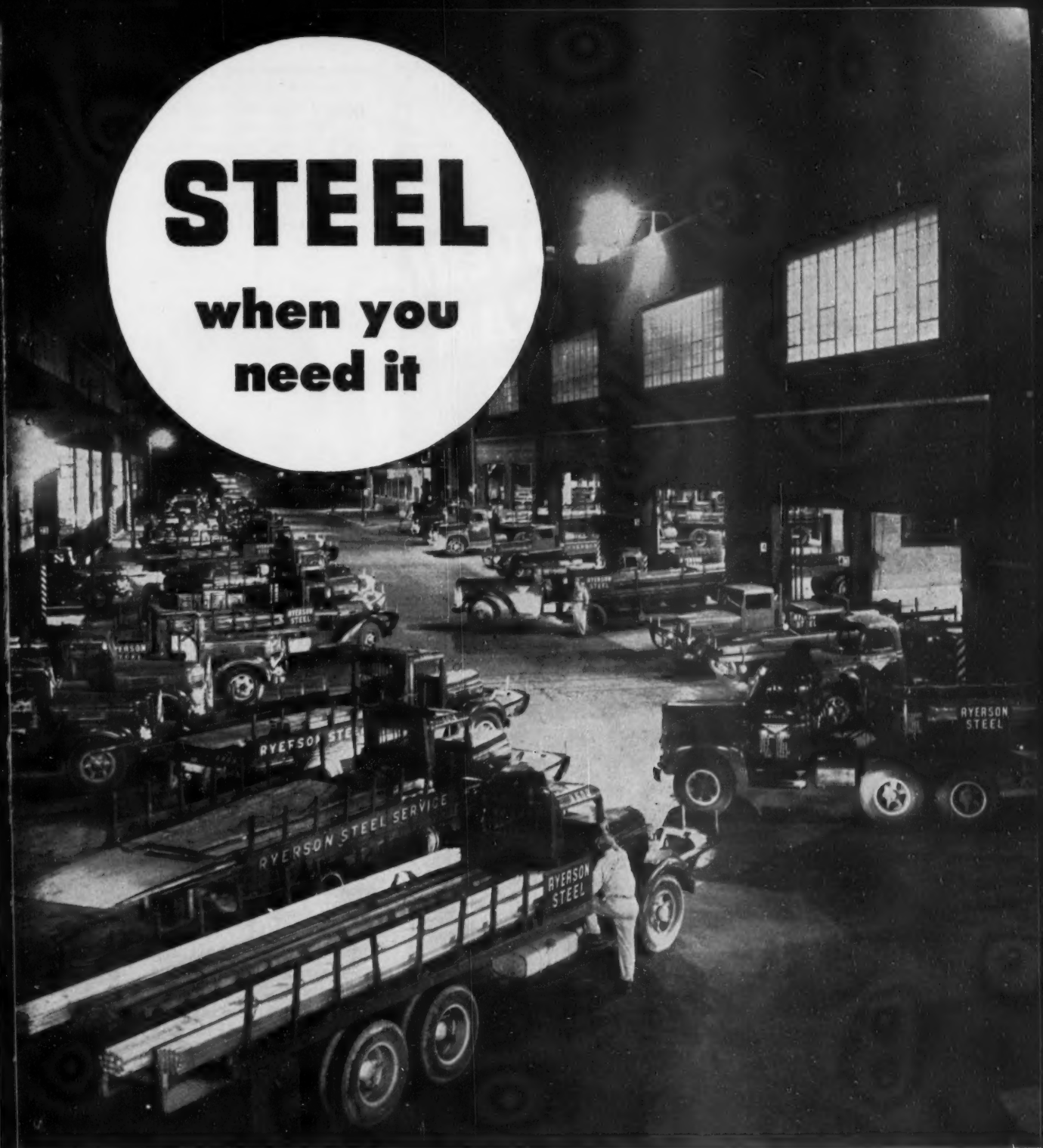
Walter E. Sutter has been named manager of sales for instruments and industrial electronic products of General Electric Co's commercial equipment department. Sutter, an electrical engineer, will be responsible for national sales of GE electronic instruments from headquarters at Electronics Park, Syracuse, N. Y. With GE since 1946, Sutter has been associated with the company's microwave application and sales section, serving in various positions.

McGraw Electric VP

W. E. Kerr of Pennsylvania Transformer Co has been appointed a vice president and a director of McGraw Electric Co, of which the transformer firm is now a division. Kerr has headed that division of McGraw Electric since the merger of the two companies in 1952. Previously he had served as president of Pennsylvania Transformer, which is located in Canonsburg, Pa.

G&W Electric Changes

G&W Electric Specialty Co, Chicago, has announced several organizational changes. C. W. Sward, vice president and sales manager, was made



● Noon or midnight the loading area of this Ryerson plant looks much the same because we work 'round the clock to make sure that you get Ryerson Steel when you need it. Carbon steel, alloy steel, stainless—every kind is on hand, in practically every shape and size. Your requirements can be set down where you want them, quickly, cut to size and ready for immediate use. Just call the nearest Ryerson plant.

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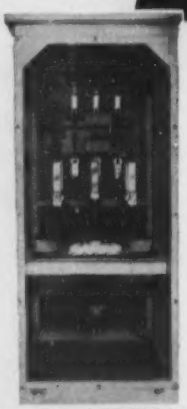
CUT COSTS

BROWN BOVERI LOAD BREAK SWITCHES



Brown-Boveri RB-20K Load Break Switches installed in cubicle, 94" x 40" x 60", rated 400 amperes, 15 KV. Switch permits full load interruption of primary of 1600 KVA 3-phase 13.8 KV to 480 Volt power transformer.

no contact replacement for 500 full current interruptions

THESE load break switches are designed with higher efficiency and lower maintenance costs in mind. The switching movement of each switch generates its own compressed air which instantly extinguishes the arc and prevents contact scorching. This operating principle makes possible 500 FULL-CURRENT INTERRUPTIONS WITH NO CONTACT REPLACEMENT or MAINTENANCE (no fire, no explosion, no fumes either). They can be installed easily in a minimum of time.

The High Breaking Capacity and High Operating Speed make these load break switches ideal for sub-station and branch-line service.

Brown Boveri Load Break Switches are available for 7.5 kV (interrupting 10,000 kVA) and 15 kV (interrupting 15,000 kVA) — for indoor service. They can be supplied in a steel housing for outdoor use.

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Atlanta, Ga. • Birmingham, Ala. • Boston, Mass. • Butte, Mont. • Chicago, Ill. • Cleveland, O. Denver, Colo. • Detroit, Mich. • High Point, N. C. • Jacksonville, Fla. • Kansas City, Mo. Knoxville, Tenn. • Lewiston, Me. • Los Angeles, Cal. • Minneapolis, Minn. • New Orleans, La. New York, N. Y. • Portland, Ore. • San Francisco, Cal. • Seattle, Wash. • Tucson, Ariz.

vice president and director of sales promotion. L. J. Dylewski was appointed sales manager and W. F. Young was named assistant vice president. Sward, an electrical engineer, began with G&W Electric in 1932. After filling several sales posts, he was named vice president and sales manager this year.

JACK K. HORTON

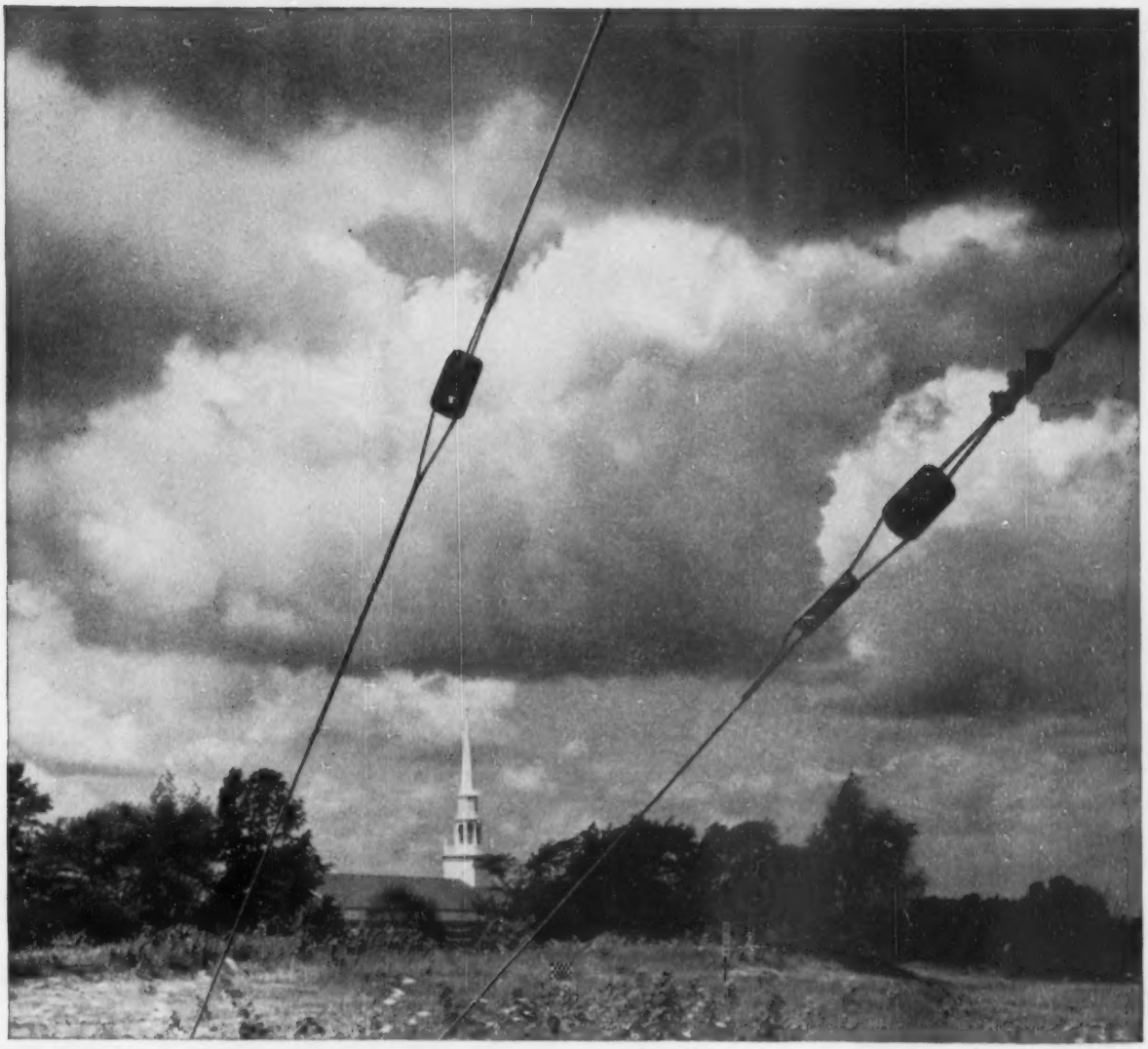
Horton Is Appointed a VP of Pacific Gas & Electric

Jack K. Horton has been appointed a vice president of Pacific Gas & Electric Co. Horton, presently president of Coast Counties Gas & Electric Co, now controlled by Pacific Gas & Electric, was also president of Pacific Public Service Co, which was merged into Pacific G&E last July (EW, July 19, p 64).

Horton, who graduated from Stanford University in 1936, was admitted to the California bar in 1941. Three years later he joined Pacific PS, serving as corporate secretary and legal counsel. In 1951 he was elected executive vice president of Pacific PS and Coast Counties G&E. In 1952 he became president of Pacific PS and chairman of the board of Coast Counties G&E. He was made president of Coast Counties G&E in 1953.

Stone & Webster Changes

Leslie O. Waite has been appointed chief electrical engineer of Stone & Webster Engineering Corp, Boston, to succeed R. R. Wisner, who becomes consulting engineer of that or-



Guy-Grips* BY PREFORMED

...Economical...Neat...Efficient

*at the left

PREFORMED LINE PRODUCTS COMPANY

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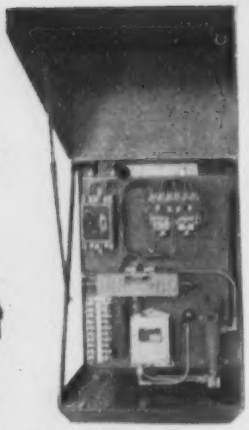
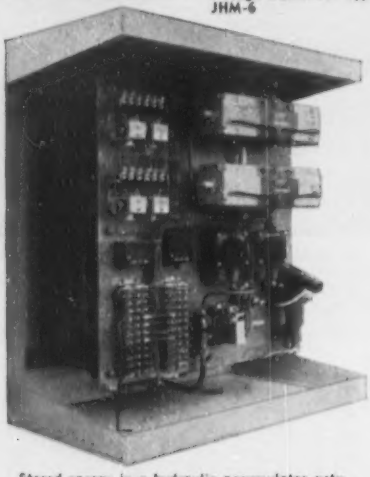
TELEPHONE: CLEVELAND EXpress 1-3571

Hydraulics
FOR GROUP OPERATED
AIR BREAK SWITCHES



For remote operation, this hydraulic motor mechanism uses standard voltages, a. c. or d. c. Type JHM

For remote operation, this mechanism incorporates 6-volt storage batteries. Type JHM-6



Stored energy in a hydraulic accumulator actuates Type JHA, independent of station power

• Hydraulic operation of air-break switches, originated by Royal in 1948, has proved to be as great an improvement in power switching as hydraulic brakes were in your car about 30 years ago. Hydraulic operation is smoother, easier, more positive, and less subject to wear. Instead of complicated and expensive mechanical linkages, copper tubing is used to conduct the actuating force. Tubing readily conforms to the shape of any switching support or substation, and permits operation at distances of as much as 100 feet from the switch to the hydraulic mechanism. Royal hydraulic mechanisms have proved their dependability, flexibility, and low cost in over 200 installations. They can be installed on either existing or new group-operated switches. They are now available for remote operation from any a.c. or d.c. voltage (Type JHM), from storage batteries (Type JHM-6), or from energy stored in a hydraulic accumulator (Type JHA). May we send you descriptive literature?

40 Years of Service to the Electrical Industry

Royal

A Part of the Arsenal of AMERICAN POWER PRODUCTION

ROYAL ELECTRIC MANUFACTURING COMPANY
INCORPORATED
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Designers and Manufacturers of Power Switching Equipment and Special Electrical Devices

ganization. In other changes, Thomas A. Fearnside was made chief mechanical engineer to replace Burton C. Mallory, who will continue to serve as consulting engineer. Myron H. Cutler was named chief structural engineer, succeeding Ernest H. Dockstader, newly appointed consulting engineer.

ATWOOD F. SEDGWICK

Assumes Engineering Job

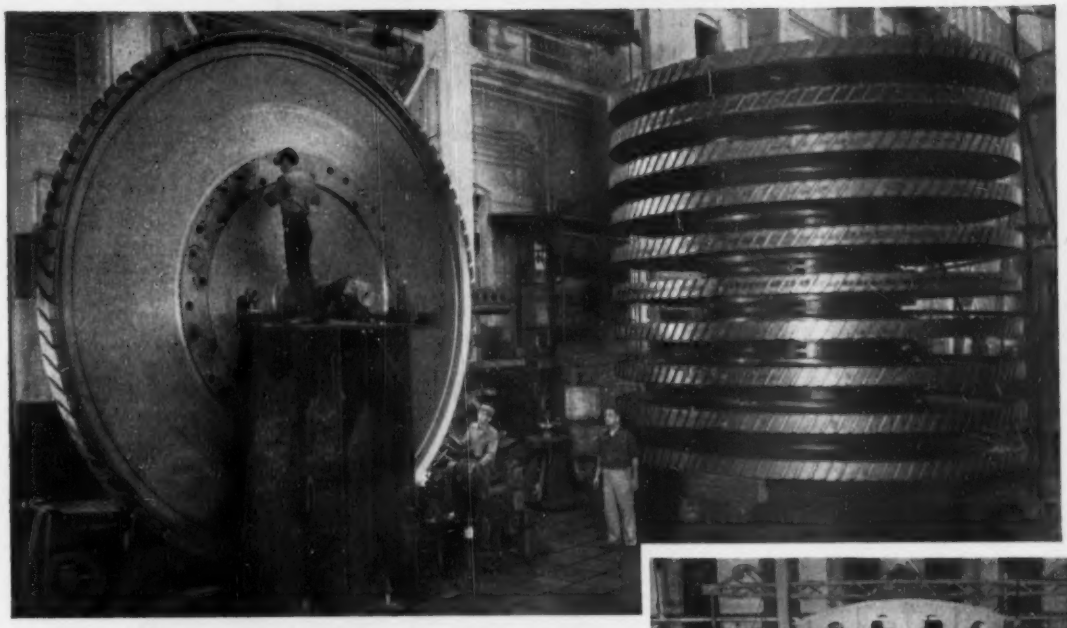
Atwood F. Sedgwick has been named chief electrical engineer of the United Illuminating Co, New Haven, Conn. He joined United Illuminating in 1943 as an electrical engineer after 16 years' employment with Central Hudson Gas & Electric Corp, Poughkeepsie, N. Y. His last position with that utility was as distribution operating superintendent of its Catskill District. He was graduated from Stevens Institute of Technology in 1926 with a mechanical engineering degree.

Executive Appointments Are Announced by RCA

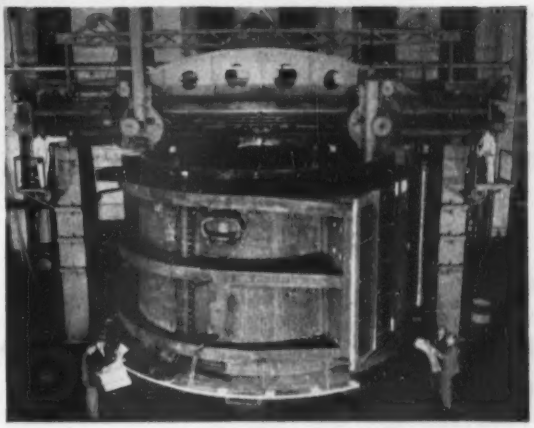
Radio Corp of America has announced these executive appointments:

Douglas Y. Smith was elected vice president and general manager of the corporation's Tube Division. Smith, who joined RCA in 1930, has served since October, 1953, as general marketing manager of that division. Austin Rising was named general manager of the RCA air conditioning department. He formerly was vice president and sales manager of O. A. Sutton

(*Continued on page* 236)



Rotor discs for mammoth 11-stage compressor were balanced and stacked for alignment in one of Newport News' five huge machine shops. Large engineering and technical staffs with a vast plant make Newport News an ideal source for large equipment . . . *standard or special in design.*



A 35-foot boring mill in Newport News' plant machining the 374,000-pound upstream housing for the giant axial flow compressor. The compressor is heart of an 8-foot supersonic wind tunnel at the Ames Aeronautical Laboratory of the National Advisory Committee for Aeronautics at Moffett Field, Calif.

To create winds exceeding

2000 MPH

Newport News builds world's Mightiest Compressor

Whenever you want large units built with careful attention to detail, give the job to Newport News.

This company recently built an eleven-stage axial flow compressor that shatters all previous records for wind force . . . using what is believed to be the world's largest rotating object.

The rotor, weighing more than 400 tons, comprises eleven huge discs. Each disc, machined from a 96,000-pound forging, was finished to a 50,000-pound wheel and balanced to within 26 ounces at the rim. In each rim, slots for blades were machined to within .005" on special milling heads designed and produced in the Newport News plant.

Here at Newport News, you'll find more than large productive capacity. In machine shops, foundries and forging plants Newport News craftsmen complete your orders with specialized techniques backed by experience in fabricating thousands of products.

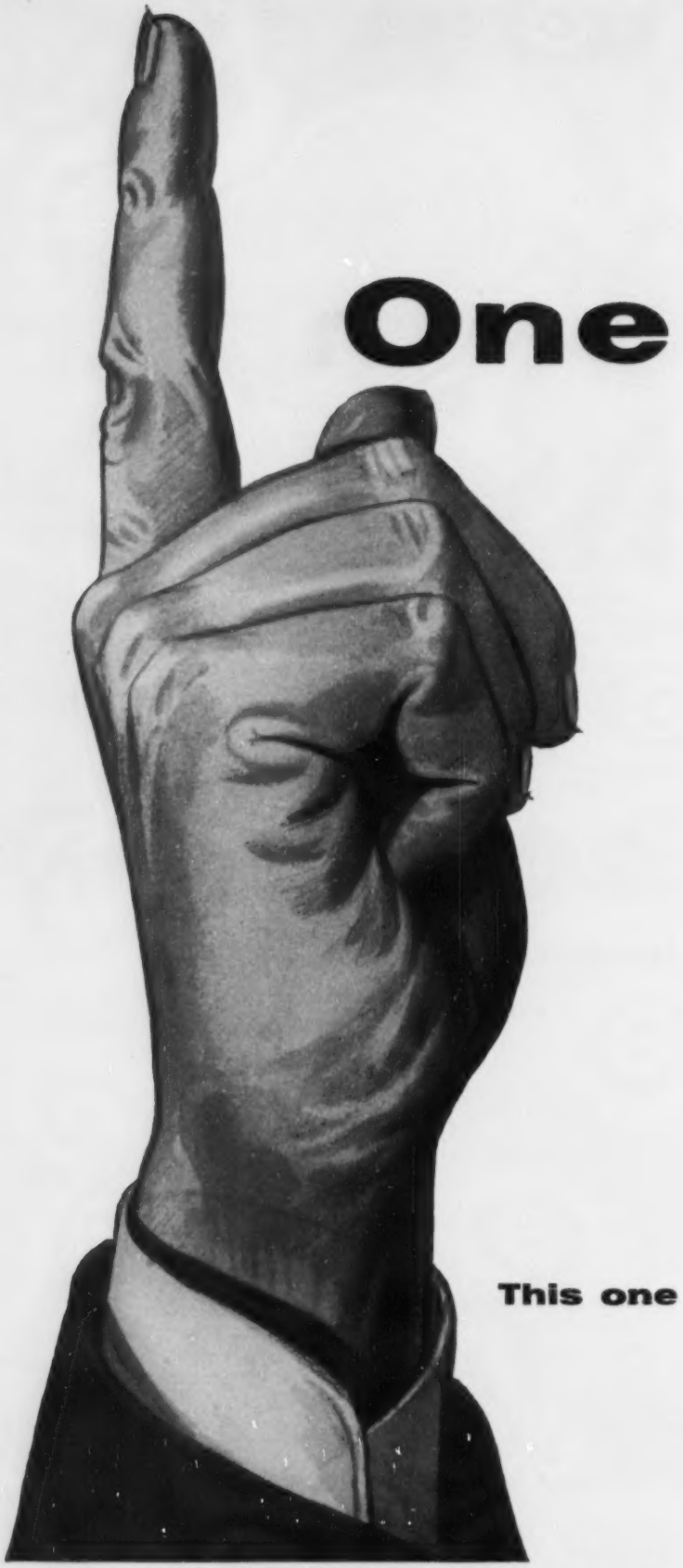
Newport News' craftsmen produce units that range from small components of spinning machines, to mammoth hydraulic turbines . . . from piping, pumps and valves, to vacuum tanks, digesters and bridge caissons.

These skilled men handle the job exactly as you want it done, for maximum results per dollar invested. So let us bid on your present or future projects. Learn how Newport News can help you. Send for our illustrated booklet entitled, "Facilities and products" . . . it's your for the asking.

Newport News

Shipbuilding and Dry Dock Company

Newport News, Virginia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One company launched the aluminum industry.

One company has 66 years of aluminum research and production experience.

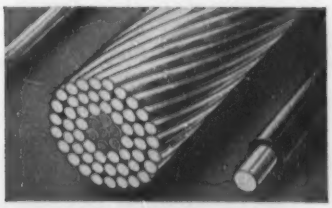
One company has 56 years of technical and field experience with aluminum conductors.

One company maintains the outstanding research, development, testing and production facilities in aluminum conductors.

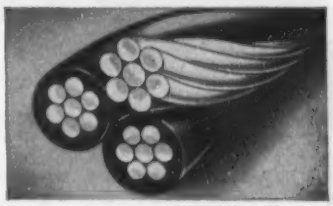
One company has developed and improved aluminum conductor alloys and aluminum conductor designs.

One company manufactures and stands behind a dependable line of both aluminum electrical conductors and accessories.

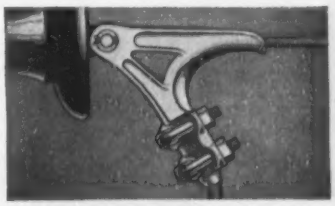
One company maintains a complete headquarters and field engineering staff to assist those who transmit and distribute electric energy.



ACSR and All-aluminum Wire and Cable



Covered Wire and Service Drop



Accessories for All Conductors

company is ALCOA

ALCOA ALUMINUM

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Fold up your derrick from inside the cab!

with the

TEL-E-LECT STORAGE KIT

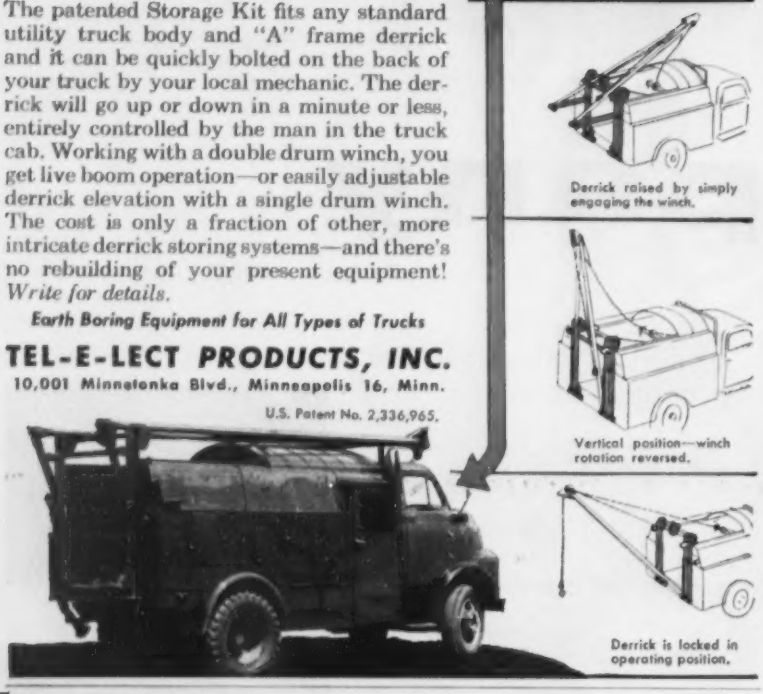
The patented Storage Kit fits any standard utility truck body and "A" frame derrick and it can be quickly bolted on the back of your truck by your local mechanic. The derrick will go up or down in a minute or less, entirely controlled by the man in the truck cab. Working with a double drum winch, you get live boom operation—or easily adjustable derrick elevation with a single drum winch. The cost is only a fraction of other, more intricate derrick storing systems—and there's no rebuilding of your present equipment! *Write for details.*

Earth Boring Equipment for All Types of Trucks

TEL-E-LECT PRODUCTS, INC.

10,001 Minnetonka Blvd., Minneapolis 16, Minn.

U.S. Patent No. 2,336,965.



Derrick raised by simply engaging the winch.

Vertical position—winch rotation reversed.

Derrick is locked in operating position.

SAVE up to 85% brush handling costs

This new M&M Brush Grinder rapidly converts 7 truckloads of brush into one truckload of chips.

Save on labor costs . . . truck operating costs. One man feeds brush or branches up to 6" in diameter into the Brush Grinder where they are chewed into small uniform wood chips and automatically blown into a truck or spread on the ground. The new M & M Brush Grinder is a portable unit with its own power plant. It hitches to jeep, car or truck for transportation right to the job. Safe easy operation with all moving parts fully enclosed. Nearly 100 years of experience in building fine grinding equipment is your assurance of long dependable service from an M & M Brush Grinder.

81

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RCA Appointments

(*Continued from page* 232)

Corp., Wichita, Kan.

Albert F. Watters was appointed vice president and operations manager of the RCA International Division. With RCA since 1935, Watters was named last February as director of associated company operations for the International Division.

Up 2 Unistrut Officials

Unistrut Products Co, Chicago, has promoted two vice presidents to new key positions. John P. Heslin, vice president of Unistrut Western Division, was named vice president in charge of sales. A. J. Croze, vice president of engineering sales, was promoted to vice president in charge of engineering. Heslin, formerly a sales executive with Westinghouse Electric Supply Co, has been with Unistrut for eight years. He was made vice president of Unistrut Western Sales Division in 1946. Croze joined Unistrut in 1940 and five years later became vice president of engineering sales.

•

Joseph F. Miller has been made assistant managing director of the National Electrical Manufacturers Association. In another Nema appointment, **Norman Wicks** was named manager of the business development department to succeed **O. C. Small,** who will become consultant to that department. Prior to joining Nema in August, 1953, as recording secretary of its wire and cable section, Miller had been serving as director of the Copper Division, Metals and Minerals Bureau of the National Production Authority. Wicks, who joined the Nema staff in 1948, was appointed January, 1953, to the post of assistant to the managing director.

Henry C. Guhl, formerly manager of engineering for the Micarta Division of Westinghouse Electric Corp, has been appointed manager of process engineering by National Vulcanized Fibre Co. Guhl, who brings to National 20 years' experience in the making of laminated plastics, will be in charge of manufacturing specifications and control and quality control. He will work in National's Phenolite (laminated plastic) Division.

SAVE

$64.25 PER 1000 FEET

with Kaiser Aluminum Triplex

As you see in the box below, when you switch from three open wire copper services to Kaiser Aluminum Triplex you save up to $64.25 per 1000 feet—based on reports from 10 utilities.*

You can be sure of getting the *maximum* savings from Kaiser Aluminum Triplex by taking full advantage of Kaiser Aluminum service. Experienced Kaiser Aluminum field engineers work with your crews right in the field where desired, demonstrate ways to speed installations and cut costs.

ACT NOW—as hundreds of power companies are doing! Convert to Kaiser Aluminum conductor easily, efficiently, economically—and save thousands of dollars a year. Contact any Kaiser Aluminum sales office listed in your telephone directory, or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc. General Sales Office, Palmolive Bldg., Chicago 11, Ill.; Executive Office, Kaiser Bldg., Oakland 12, Calif.

Kaiser Aluminum

The nation's largest producer of triplex and aluminum weatherproof conductor

Here is a typical example of the big savings possible with Kaiser Aluminum Triplex

INSTALLED COSTS FOR 10 SERVICE DROPS (Average Length of 100 ft.)

	#6 Solid TBWP Copper	#4 Kaiser Aluminum Triplex (Oyster)
Cost of conductor	$135.15	$103.00
Cost of pole taps, entrance connectors, house wireholders	15.30	14.70
Total materials cost	$150.45	$117.70
Total labor cost	80.80*	49.30*
TOTAL COST	$231.25	$167.00

TOTAL SAVING—$64.25—PER 1000 FT.!

*Average labor costs based on reports from 10 utilities in various sections of the country that have switched from three open wire type service to Kaiser Aluminum Triplex.

Setting
NEW
Records

HELPING PUBLIC UTILITIES to set new records —through the financing of expansion and modernization —is an important function of Guaranty Trust Company.

OUR OFFICERS have a thorough knowledge of the financial requirements of the public utilities industry. Their past experience and understanding of present trends and future needs are readily available to you.

Guaranty Trust Company of New York *Capital Funds $395,000,000*

140 Broadway, New York 15

Fifth Ave. at 44th St. New York 36 | Madison Ave. at 60th St. New York 21 | 40 Rockefeller Plaza New York 20

LONDON 32 Lombard St., E. C. 3 Bush House, Aldwych, W. C. 2 | PARIS 4 Place de la Concorde | BRUSSELS 27 Avenue des Arts

Member Federal Deposit Insurance Corporation

Pacific G&E Merger

(*Continued from page* 116)

being retained in the merged organization, and will keep their seniority, pension rights, group life insurance, and other employee benefits through similar PG&E programs.

EEI Says Money Raised in '54 Tops '53's 1st Half

Greater amount of new capital was raised by investor-owned electric utilities during the first half of 1954 than during the same period in 1953. Long term debt increased substantially as did preferred stocks, while common shares decreased, according to an Edison Electric Institute report.

Following is a breakdown of new capital raised during the first six months of 1954 and of 1953.

	1954 $	1953 $
Long-Term Debt ..	794,249,600	707,350,000
Preferred Stock ...	190,153,960	173,187,000
Common Stock ...	264,744,741	329,035,000

Table shows all securities sold except issues or portions of issues used for refunding. Figures are greater than for electricity alone as capital raised by combination companies is included.

Alabama Power Charged For U. S. Dam Benefits

Alabama Power Co has been directed by the Federal Power Commission to pay the U. S. government $76,583 because three of its hydroelectric projects directly benefited by construction and operation of the federal Allatoona Project during 1950-1952.

In addition, the company must pay FPC $6,092 to cover the cost of making the determination of annual charges due.

Projects that the commission found to have benefited from the Allatoona Project, located on the Etowah River in Georgia, are Alabama Power's Lay, Mitchell, and Jordan projects on the Coosa River.

Investigation was instituted in October, 1951, under Section 10(f) of the Federal Power Act to determine whether these projects directly benefited by the upstream federal project.

WHY IT PAYS TO BUY MECHANICAL TUBING FROM US

● Our wide experience with all types of tubing problems has saved a lot of money for a lot of our customers. For example, we can often find a less costly type of tubing that will do a job as well or even better than a type that might cost more, but would not be "best" in that particular application.

You too may benefit from our accumulated "know-how." For no matter what type or size job you have, you can always depend upon us for thorough, up-to-date technical assistance.

And our more-than-complete tubing stocks—we carry 531 sizes of Shelby Seamless Tubing—means that you will get fast delivery of exactly the type you want. It's all top quality tubing too . . . manufactured by the National Tube Division of United States Steel.

So let *us* carry the costly, cumbersome tubing inventory that can meet your every requirement . . . competently, quickly. Call us when you need: mechanical tubing, round and square, seamless and welded; boiler tubing, pressure tubing and pipe; stainless steel tubing, seamless and welded, and stainless pipe.

TRIPLE SECURITY

What you want
When you want it
At the right price

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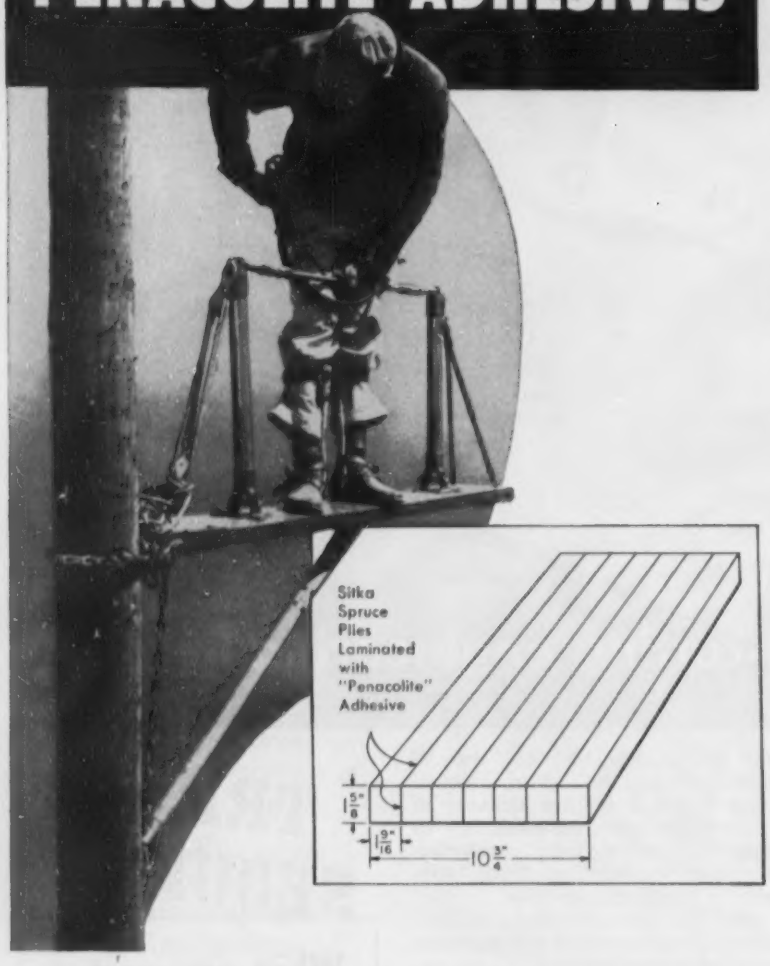
Coast to Coast

USS TRADE MARKS SHELBY MECHANICAL TUBING UNITED STATES STEEL

UNITED STATES STEEL

LIGHT yet STRONG

this platform is laminated with PENACOLITE® ADHESIVES



● Constructed of 1¾" thick plies of Spruce, this linesman's platform weighs only 32 pounds—yet has high breaking load capacity—thanks to lamination with "Penacolite" adhesives produced by Koppers. It is manufactured by the Bodendieck Tool Company of Taylorville, Illinois, veteran suppliers to the utility field.

"Penacolite" adhesives were specified for this job because the bonds had to be as strong as the wood itself. And "Penacolite" bonds stay strong. They are waterproof and cannot be weakened by temperature or humidity changes. In addition, "Penacolite" adhesives are easy to use and cure quickly—in a few hours at room temperature (70°) or in just a few minutes when accelerated by heat.

If you would like more information on this Koppers product, write for our free illustrated booklet on "Penacolite" adhesives.

KOPPERS

KOPPERS COMPANY, INC.

Chemical Division, Dept. EW-920, Koppers Bldg., Pittsburgh 19, Pennsylvania

PENACOLITE® RESORCINOL ADHESIVES

The original waterproof, room-temperature-setting adhesives

And if so, the FPC was to determine the equitable portion of the annual charges for interest, maintenance, and depreciation on the Allatoona headwater improvement which the company should pay.

Federal Power Act requires the commission to assess such charges whenever any licensee is directly benefited by the construction work of a storage reservoir or other headwater improvement by another licensee, a permittee, or the United States.

Tax for Street Lighting Up to Portland Voters

Voters in Portland, Ore., will decide Nov. 2 whether to tax themselves $1 million a year for ten years to modernize the city's arterial and residential street lighting system.

Lighting system proposal was first suggested by the Portland Junior Chamber of Commerce. The plan called for a levy starting at ¼ mill and advancing annually ¼ mill to a maximum 1 mill while council continued budgeting $390,000 annually from the general fund. But the city commissioners changed the proposal to call for a ten-year levy of 1½ mills or $1 million, whichever is the lesser.

Jaycee members took up the lighting program as a project after the National Safety Council reported that Portland had only nine miles of adequately lighted streets. Richard Layton, chairman of the Jaycee committee and a Portland General Electric Co employee, reported that some 300 miles of arterial streets and 4,000 residential intersections that are not illuminated at present would be improved.

N. M. County Objects to REA Plant Valuation

New Mexico State Tax Commission will re-examine the January, 1954, assessment valuation placed on the REA generating plant at Algodones because of a protest by the Sandoval County assessor.

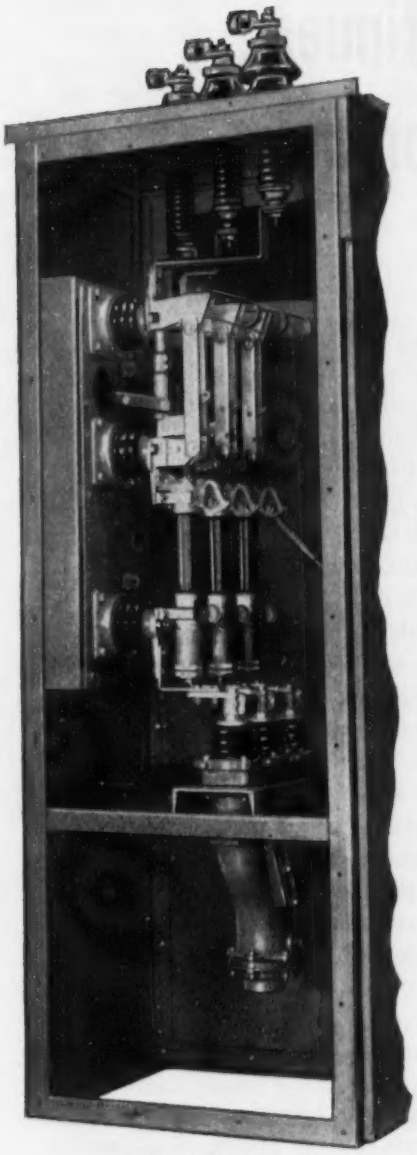
For work completed before January, 1954, the commission had set a valuation on the new plant of $35,000, which determines the tax assessment

(*Continued on page* 244)

Buy FIRST CLASS Switchgear and SAVE MONEY TOO!

For substations, load and switching centers Three E switchgear is built to high standards of (1) Safety (2) Accessibility and in a style that permits of (3) Economy.

1. **Equipment is metal enclosed with all design features in accordance with best engineering and manufacturing practices. When requested positive interlocks with enclosure doors and associated equipment provide additional safety.**
2. **All component parts are readily accessible for inspection, adjustment and maintainance.**
3. **Because Three E Air Interrupter Switches are used for load switching, and power fuses for clearing short circuits, substantial savings in costs are possible, over other types of equipment.**



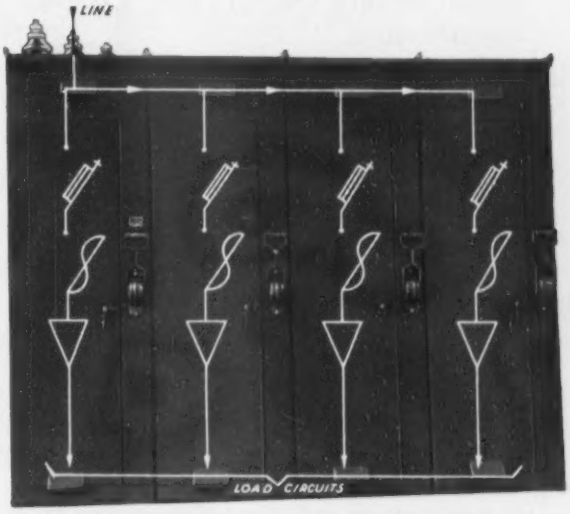
End view with side plate and barriers removed.

SYMBOLS

Air Interrupter Switch

Power Fuse

Cable End Bell



Front view of outdoor type four circuit switchgear assembly.

All Three E switchgear follows the modern trend of using self generated gas blasts which confine and extinguish arcs with no damage to equipment.

Consult your nearest Three E representative, or write us direct regarding your switchgear requirements.

THREE E — ELECTRICAL ENGINEERS EQUIPMENT CO.
MELROSE PARK, ILLINOIS

RESULTS OF AN INTELLECTUAL REVOLUTION . . .

"The Western Miracle" Continues . . . More Automatic Controls for Industry

Within recent weeks three new monthly technical magazines devoted to automatic control systems for industrial processes and machinery have offered the public their first issues. One of these is CONTROL ENGINEERING, a McGraw-Hill publication.

What has caused this surge of interest in the design and application of automatic control systems? What does it portend for the future of American industry? More important, what does it promise for the American standard of living, of which industry is and must be the servant? And what is the role of CONTROL ENGINEERING in this development? It is to those questions that this statement is addressed.

A New Intellectual Revolution

It is frequently asserted that we are now in the throes of a new industrial revolution. The revolution is described as the eliminating of wasteful applications of human labor to repetitive tasks through new technology which makes it possible to transfer those tasks to automatically controlled machinery.

It is perhaps more accurate, however, to say that we are the beneficiaries of a new intellectual revolution in the application of science to industry. This new intellectual revolution points the way toward giant strides in the continuing process of taking dull and laborious work off the backs and minds of men and transferring it to machines operating in large batteries under automatic control.

The practical engineering work required to convert this intellectual revolution into a full-scale industrial revolution, however, in large part still remains to be done. It is to this task that CONTROL ENGINEERING will be devoted. Its role is that of bridging the gap, in engineering and economic terms, between the new conceptions of automatic control of industrial processes and their practical workaday application. These conceptions run the full gamut from systems of control for automatic factories making heavy industrial products to highly personalized systems of automatic control to warn people when they are approaching the broiling point in sunning themselves at the beach or becoming too drowsy to drive their cars safely.

Enter the "Feed-Back" System

Enough work has been done to move these conceptions out of the realm of interesting dreams and into the realm of practical possibilities, and in some cases into the realm of practical realities. Crucial parts of this work were done during World War II when weapons were successfully equipped with "feed-back" systems

that automatically corrected mistakes made by the weapons in locating their targets.

The principle of the "feed-back" system is as ancient as the personal monitor that tells us not to run into each other as we walk along the street. It feeds back to our locomotion machinery the warning of a collision ahead. But the application of the principle to weapon control and then to more general machinery control required superlatively imaginative and skillful scientific development.

When a "feed-back" system that monitors an automatic process and keeps it lined up precisely is teamed up with a computing machine, capable of making lightning calculations that control both what goes into the process and what is done with the product, the horizons of automatic control become broad indeed. But in large part they still remain horizons. A vast range of practical engineering work remains to be done to realize anything like the full potential of automatic control of industrial processes and machinery.

More and Better Jobs

There are those who view the surge of interest in automatic control with alarm. They conjure up a situation in which automatic processes will at once expand the ranks of the unemployed and reduce many of those still working in industry to the status of robots or automatons.

A look at the record of the American economy — a record of amazing growth, steadily improving job opportunities and a constantly rising standard of living — demolishes the basis for such fears. The introduction of new and more efficient industrial machinery and processes obviously cannot be accomplished without creating some disturbance for some individuals and some companies. But consistently the longer range effect of such local and temporary disturbance has been more jobs and better jobs for Americans.

It is no accident that, while the proportion of industrial wage earners in our population is virtually the same as it was in 1920, the proportion of professional and salaried workers has doubled. The proportion of unskilled workers, furthermore, has dropped by half. This has been an essential part of a continuing process by which drudgery has been transferred to machines while the workers who formerly did the drudgery have been graduated to jobs calling for greater competence and providing better pay.

Higher Living Standard

A British historian, H. J. Hancock, has referred to this general process as "the Western miracle" — that of providing an ever higher and higher standard of living for more and more Americans. The key element in this miracle has been more and more reliance on power-driven machines to get the day's work done.

In the nature of the extremely complicated apparatus involved, full development of systems which have passed through the "think stage" into the status of practical possibilities will be a time-consuming process. It will also be a very exacting process, calling for a tremendous application of engineering skill and ingenuity. However, the engineers who are concentrating on this difficult, workaday phase of the development of apparatus for automatic control will be inspired by the knowledge that they are making a crucial contribution to technical progress which holds great promise of good for the American people.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

PRESIDENT

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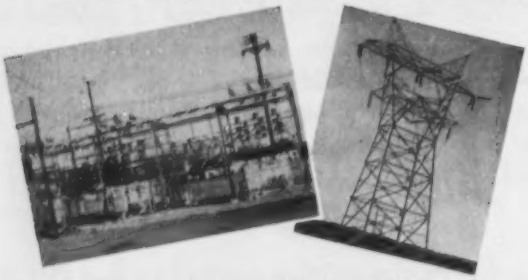
STEEL SPECIALISTS — FOR THE ELECTRICAL INDUSTRY



Let us help you with your needs for galvanized structural steel. We specialize in *your* requirements; consultation, scheduling, detailing, fabrication and erection. Eighteen years of specialization in the fabrication of *transmission towers* and *substations* serve as proof of our ability to satisfy your needs. Try us!

FLINT STEEL

FLINT STEEL CORPORATION

TULSA • MEMPHIS

REA Plant Valuation

(*Continued from page* 241)

for this year. County assessor said the figure was too low in view of the $5.8-million value placed on the completed plant by officials of Plains Electric Generation Cooperative.

The co-op officials will present a breakdown of the work completed as of last January at a future meeting with the tax commission.

Cal Electric Gets $90,367 Interim Rate Increase

California Public Utilities Commission has authorized a $90,367 a year interim rate increase to California Electric Power Co, Riverside, Calif., effective Sept. 13. The order will affect bills of approximately 8,300 customers in San Bernardino with an average monthly increase of 12%.

The commission's order is in line with the recent increase granted Southern California Edison Co, serving the same area.

Calelectric has another application for a system-wide increase of $1,337,000 currently being heard by the commission.

Proposes Arkansas Make Rate Regulation Study

Arkansas State Legislative Council has been requested to study public utility rate regulation of other states. Sen Max Howell submitted the proposal, suggesting there is some question concerning what cost items should be permitted as operating expenses.

Specifically mentioned are costs of public relations, advertising, gifts, and kindred expenses. Other items mentioned were whether a utility should be allowed a return on equity investments and on cost of plant facilities that have not been placed in operation.

Puget Sound P&L Applies For Space-Heating Rate

Puget Sound Power & Light Co has applied to the Washington State Public Service Commission for an electric space-heating rate in its western Washington service area. If approved, the

Here's Proof of Performance...

Average annual replacement of Creosoted poles is only 1.3% on this 38-year-old line

● Keeping pace with the state's industrial expansion, the Georgia Power Company has invested 238 million dollars in new generating, transmission and distribution equipment since the end of World War II. The tremendous output of this expanded system is distributed to users on pressure-creosoted poles.

A. C. Henderson, supervisor of transmission lines, explains, "We have tried other types of poles in the past, but we always go back to pressure-creosoted southern yellow pine."

Experience has proved pressure-creosoted poles held replacements to a minimum. A 44,000-volt line near Atlanta has been in service since 1916. There are 1,159 poles in the line, and since present record-keeping methods were begun in 1942, only 166 poles have been replaced. That's an average annual rate of 1.3% on a line now 38 years old.

Long pole life and a low replacement rate like this can be confidently expected when poles are pressure-treated with Creosote—the preservative with *proved* records of long-term performance.

And you'll get best results with USS Creosote, the uniform product of United States Steel's tar distilling operations. For complete information, contact our nearest Coal Chemical sales office or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

C. C. WHITE is inspecting one of the 38-year-old pressure-creosoted poles in the 31.6 mile line of the Georgia Power Company, between Norcross and Porterdale.

USS CREOSOTE

USS

4-1872

UNITED STATES STEEL

Every Movement has a SAVINGS of its own . . . . .

SAVE UP TO 75% of MATERIALS HANDLING COSTS WITH

HEAVY-DUTY FORK LIFTRUK OR LIFT-O-KRANE

Leading Public Utilities find these heavy-duty, rugged SILENT HOIST machines dependable and efficient for the continuous, complex requirements of the transportation department, storage area, repair shop . . . in the movement of Generators and other heavy equipment, Cable, Wire, Maintenance Supplies, Poles and general equipment.

The LIFTRUK *Fork Lift Truck* and LIFT-O-KRANE *Combination Crane and Fork Lift Truck* handle capacity loads with maximum stability and safety. They have high lifting range. Make short turns in narrow spaces. Promote maximum efficiency for storage areas . . . and effect rapid inloading and outloading, with economic use of manpower.

Send for Bulletin 77 for LIFTRUK. Bulletin 75 for LIFT-O-KRANE

Makers of KRANE KAR Mobile Boom Crane, KARRI-GO Front Boom Crane, SILENT HOIST Cranes for Motor Truck Mounting, SILENT HOIST Winches and Capstans, SILENT HOIST Hydraulic Telescopic Truck Towers, etc.

SILENT HOIST & CRANE CO.

Pioneer Manufacturers of Heavy-Duty Equipment for Public Utilities and Municipalities

862 63rd STREET, BROOKLYN 20, N. Y.

rate will go into effect this month.

Under present rates, few space-heating customers come under the all-electric rate, paying $4.50 for the first 270 kwhr, 7 mills for the next 730, and 1¢ for everything over 1,000 kwhr. The new rate would provide that demands over 10 kw, at 160 kwhr per kw, would pay 1.8¢, after the initial 270 kwhr at $4.50.

Puget Sound P&L has not accepted an application for space heating since World War II, but believes it now has the capacity to take care of additional load. Furthermore, says Lawrence E. Karrer, executive vice president, an agreement exists among members of the Puget Sound Utilities Council which provides that each member helps the other to meet requirements.

FINANCIAL BRIEFS

Secondary Offerings . . . Goldman, Sachs & Co has sold 13,335 common shares of Arkansas-Missouri Power Co at $22.75 a share . . . Blyth & Co has sold 13,000 common shares of Louisville Gas & Electric Co at $47.625.

Northern States Power Co, Minn., has acquired properties of Telden Electric Light & Power Co in Wisconsin, adding 150 customers.

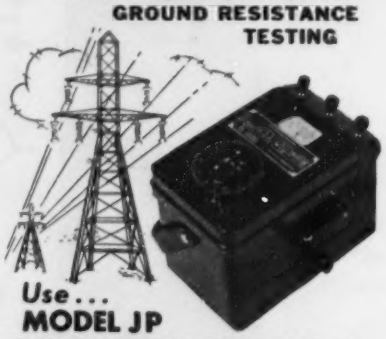
RATE BRIEFS

Central Illinois Electric & Gas Co's hearing before the Illinois Commerce Commission on a $1.2-million utility rate increase has ended, and decision is expected by Oct. 5 . . . **Public Service of Colorado's** request for a $3.8-million electric rate increase has been taken under advisement by the Public Utilities Commission of the State of Colorado.

Coast Counties Gas & Electric Co has the approval of the California Public Utilities Commission to raise its rates to the pre-April 1954 level to take into consideration Federal income tax rise from 47 to 52% . . . **Clark County PUD** has lowered commercial space heating, water heating and cooking rates to 9 mills per kwhr, with a minimum charge of $1 a month.

FOR A GOOD GROUND!

. . . AND QUICK, ACCURATE GROUND RESISTANCE TESTING



Use . . . MODEL JP GROUND OHMER

Triple Range 0-10/100/1000 ohms. Direct reading. Accuracy not influenced by resistance of probe or auxiliary ground, with practically no interference from direct or alternating stray currents. Entirely self-contained with built-in hand crank generator. Ready any time, any place. Light weight (no batteries) 10 lbs. Small size 5½" x 9" x 7¼".

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CHAIN LINK WIRE FENCE—All Boom Framework—the heaviest and strongest made

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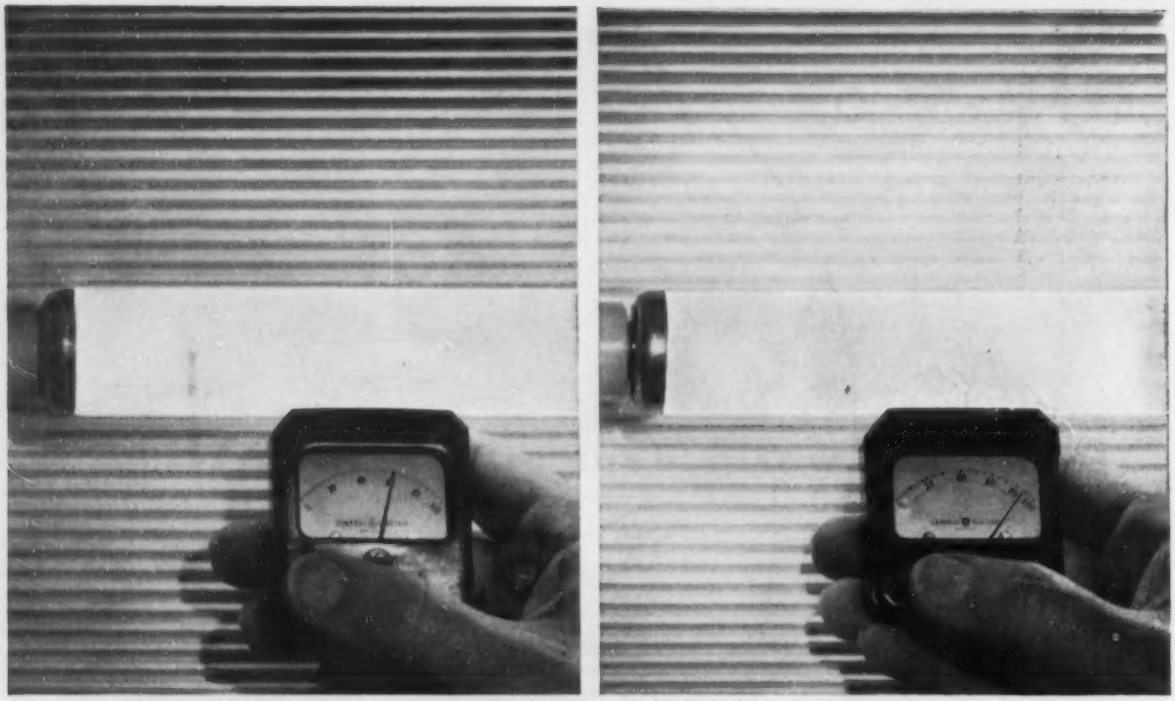

Regular slimline, left, gives 620 units of light. New High Output Rapid Start lamp, right, gives 840 units of light.

NEW GENERAL ELECTRIC FLUORESCENT LAMP GIVES ⅓ MORE LIGHT THAN ANY PREVIOUS FLUORESCENT

LIGHTS ALMOST INSTANTLY—General Electric announces the most important advance in fluorescent lighting in 10 years: the new High Output Rapid Start fluorescent lamp. The 96-inch High Output lamp gives 36% more light than the most powerful G-E fluorescent lamp previously available.

For new installations, General Electric High Output lamps offer this ⅓ bonus of light without increasing the number of fixtures or maintenance costs.

This big increase in light, with no increase in lamp size, has been achieved through a special cathode developed by General Electric which permits a boost in lamp wattage to 100. Because the cathode is of the famous General Electric triple coil design, these Rapid Start lamps light up almost instantly. General Electric High Output lamps have a rated life of 7,500 hours, the same as all General Electric general lighting fluorescent lamps.

A new G-E base and socket design protects the lamp contacts by recessing them. A simple push-pull sets the lamp in its fixtures.

HAS VARIETY OF USES

The new General Electric High Output fluorescent lamp is especially suited for use in areas with high ceilings, in factories, warehouses, offices and stores. Also in store windows, showcases and other places where you want higher lighting levels in keeping with the modern trend. New fixtures designed for the G-E High Output lamp will soon be available from a number of lighting fixture manufacturers.

For information, write to Lamp Division, General Electric Company, Dept. 166-EW-9, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

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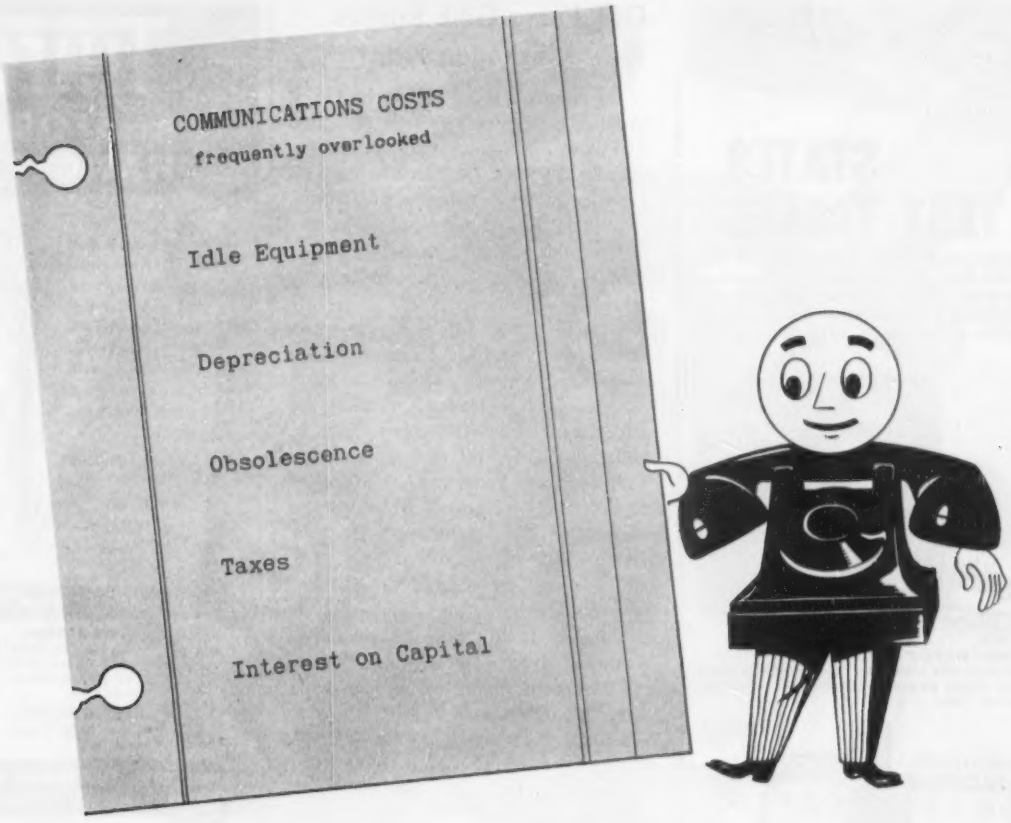

BELL SYSTEM TAKES THE HIDDEN COSTS OUT OF YOUR COMMUNICATIONS

The first cost isn't the last cost, when you provide your own communications. Many of the continuing costs are buried deep in idle equipment, taxes, depreciation, loss of interest on capital.

Bell System gives just the service you need—at low cost. It's tailored to your operations today, and flexible to meet possible change tomorrow. Your Bell System communications are efficient and dependable, with new equipment and techniques constantly being developed to improve your service.

When you use Bell System communications, you get the benefits of trained personnel, expert supervision, continuing analysis. This high-quality service doesn't tie up capital but leaves your money free for income-producing investments in your business.

• • •

A complete communications study, made without charge, often shows ways a power company can economically improve service, increase efficiency or create economies. Talk this over with your Bell Telephone representative.

PRIVATE-LINE TELEPHONE

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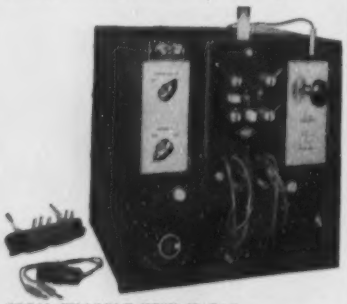
Test with the Best— Test with

STATES TEST TABLES

States complete line of test tables are tops in the field for dependability and ease of operation. Each test table designed and developed by States is your assurance of quality and successful meter testing.



FORM "HAPBL" TEST TABLE
Compact and complete. This versatile table tests single phase and polyphase watthour meters, Type A & S.

THERMAL DEMAND 100 AMPERE CAPACITY TEST TABLE
Will test from 1 to 23 meters of 100 ampere capacity.

FORM "CTT" CURRENT TRANSFORMER TEST UNITS
One of the many types of current transformer Test Units built by States. (1000—2500—5000—10,000 amp.)

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I am interested in testing
☐ Meters ☐ Transformers
Name..... Title.....
Firm.....
City..... Zone..... State.....

Oklahoma G&E Rushes New Muskogee Plant

Oklahoma Gas & Electric Co is moving at top speed in construction of a new 170,000-kw plant at Muskogee, Okla., which it wants to get into production by the summer of 1956.

So far, the property has been surveyed and contours made. Excavation is expected to get under way early this fall.

OG&E, which like many other utilities, experienced record-breaking loads this summer, expects the same next year and the next. A 112,000-kw addition to its Mustang station in Oklahoma City will take care of the 1955 increase, but company engineers expect the Muskogee plant to be needed to take care of peak loads in 1956.

The new plant, to cost $21 million, will house the largest generator in Oklahoma. It will be located on the Arkansas River adjacent to the existing Riverbank plant, and will be semi-outdoor in design. It will be integrated into the OG&E system through construction of 114 miles of 161-kv transmission lines between the plant and the company's Horseshoe Lake station at Harrah.

Upon completion, Muskogee will be second only to the Mustang plant in size. Mustang's capacity will be upped to 212,000 kw when its new addition is put in service next April.

USBR's Hydro Revenue Sets Record in Fiscal '54

Reclamation Bureau hydroelectric revenue set a record at $50,812,260 in fiscal 1954 despite a net decrease in kilowatthours sold. Hungry Horse Dam operations throughout the year were held responsible for the revenue rise.

Fiscal 1953 revenue was $44,963,-049.

Commissioner W. A. Dexheimer reported Hungry Horse Dam produced for sale 685,023,780 kwhr in fiscal 1954, bringing in $4,300,259, compared with the $825,889 in revenue from the 132,740,320 kwhr it turned out the previous year.

Hungry Horse storage aided Grand Coulee Dam, downstream on the Columbia River, to top previous output with 14,224,917,000 kwhr, bringing in $12,545,618.

The reductions in output occurred

THIEL TRANSFORMER HANGERS

Heavy-gauge steel construction, hot-dip galvanized for long life. Designed to NEMA specifications. Furnished with galvanized bolts and nuts.

MODEL C-1
for 75-100 KVA 1-Phase

MODEL C-3
for 75-112½ KVA 3-Phase

IN STOCK

T-TYPE HANGERS
in two sizes. For 3-50 KVA 1-Phase and 9-45 KVA 3-Phase transformers.

HANGER KICKERS
in sizes to fit T-type hangers.

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PRESSITE
an unsized fibreboard having excellent dielectric, physical and chemical properties. Is used principally in air, oil and askarel transformers.

ELECTRITE
a high grade board for electrical insulation, possessing high tensile and dielectric strength. Used in a large variety of punchings and other insulating applications.

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an extremely hard and tough board of superior quality. Used by many leading manufacturers of electrical equipment to replace more expensive types of insulating materials.

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ARE YOUR HANDS TIED...

BECAUSE EXISTING CIRCUITS LACK ADEQUATE CAPACITY TO CARRY THE LOAD

ROCKBESTOS AVC®

(N.E.C. TYPE AVA)

CAN INCREASE CURRENT CAPACITY 30 TO 50%

All you need do to get added capacity without changing present conduit is to rewire present circuits with Rockbestos A.V.C. . . . the wire and cable that size for size carries more current than other types of insulated wire.

Phone or write the nearest Rockbestos branch office and one of our wire specialists will analyze your particular requirements.

STOCKED COAST TO COAST

Standard Rockbestos A.V.C. (N.E.C. types AVA, AVB, etc.) are available from stock for immediate shipment. Call or write nearest branch office.

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PITTSBURGH • ST. LOUIS • LOS ANGELES • NEW ORLEANS
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Pull Lead Covered Cables

The "old reliable" IMPROVED compound . . . just brush it on cable . . . unaffected by summer heat or zero temperature . . . clean to handle . . . easy to wipe off . . . sticks to sheath even in water-filled ducts . . . actual dynamometer tests show greatly reduced pulling stresses . . . send for further data and free working sample NOW.

Easier with . . .

ALBANY

Improved Cable Pulling Compound

and for wires with rubber or other coatings, use

RBR

Will not affect rubber or other coatings . . . excellent for nonmetallic cable . . . permanent . . . allows easy wire removal in later years . . . nonevaporating . . . needs no mixing . . . will not separate or harden . . . light, clean to use, can be washed off with water. Send for further data and free working sample NOW.

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Mfrs of Lubricating Products since 1858 LINDEN, NEW JERSEY

PAGE FENCE *Since 1883*

• AMERICA'S FIRST WIRE FENCE •

• Page Chain Link Fence, pioneered by Page and made only by Page, is quality controlled from raw metal to erected fence. Whether you choose heavily-galvanized Copper Bearing Steel, or long-lasting Stainless Steel, or corrosion-resisting Aluminum, you'll have a rugged fence on sturdy metal posts deep-set in concrete. Choose any one of 8 basic styles, varied by heights, types of gates, posts, top rails and barbed wire strands for extra protection. And to be sure of reliable workmanship your fence will be expertly erected by a specially trained firm. For helpful Page data and name of member nearest you...

Write to PAGE FENCE ASSOCIATION in Monessen, Pa., Atlanta, Bridgeport, Chicago, Denver, Detroit, Los Angeles, Philadelphia, New York or San Francisco.

PRODUCT OF PAGE STEEL & WIRE DIVISION OF AMERICAN CHAIN & CABLE COMPANY, INC.

particularly on the Colorado River system, including Hoover Dam, and on the Rio Grande River in New Mexico. Both areas have major water shortages.

Use of Fly Ash in Bricks Under Study in Britain

London — (McGraw-Hill World News)—Research work into the use of fly ash for brick building undertaken at the Building Research Station of the Department of Scientific and Industrial Research, Bucknalls Lane, Garston, Watford, Hertfordshire, England, may result in brick works being built at the British Electricity Authority's power stations.

More than 2 million tons of fly ash is produced at British power stations each year. While small quantities of this ash have been used in brickmaking for some years, being mixed in with other materials in proportions of the order of 20%, research has now shown that fly ash can be used to make fully satisfactory bricks when mixed with clay in proportions as high as 85% ash to 15% of clay.

The fly ash can also be used to make concrete blocks resembling breeze blocks. This is done by treating the ash with water and then forming it into pellets. These pellets are heated to red heat which hardens them, and are then mixed with cement.

Con Ed Puts $10.5 Million More into Smoke Control

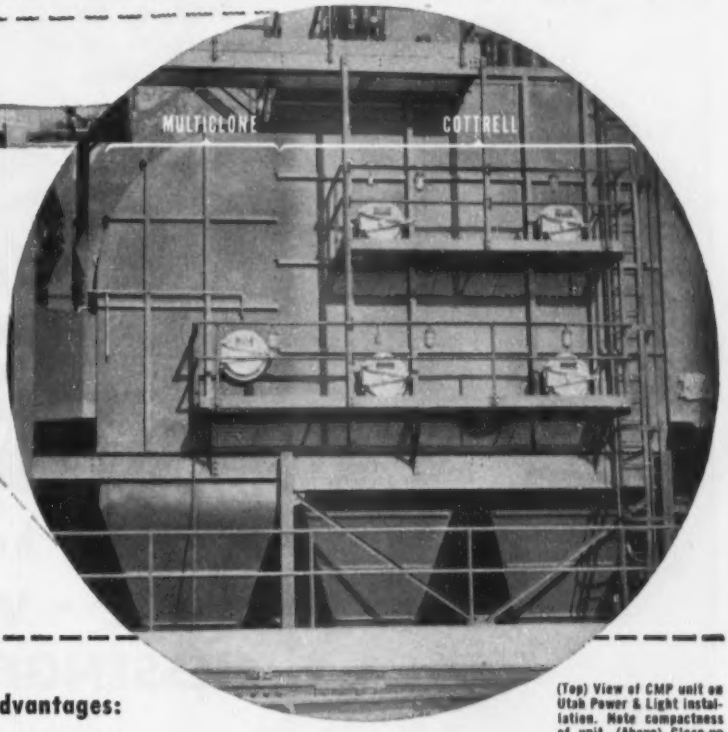
Consolidated Edison Co of New York, Inc., will spend another $10.5 million to complete a smoke control program currently in progress at its Hudson Avenue generating plant in Brooklyn.

New appropriation, which is in addition to nearly $3.7 million already spent for Hudson Avenue's smoke control, will be used to convert the plant's remaining 16 stocker-fed coal boilers to oil and to build new storage, pumping, and dock facilities. Conversion of the first 16 boilers was completed on Sept. 1.

Con Edison reports smoke control expenditures at all its stations total $28 million and plus authorizations amount to $42 million since 1937.

Planning A Fly Ash Recovery Installation?

Consider these important advantages of a WESTERN PRECIPITATION CMP UNIT!



(Top) View of CMP unit on Utah Power & Light installation. Note compactness of unit. (Above) Close-up of same installation.

IF YOU are planning the installation of any type of fly ash recovery equipment—mechanical or electrical—it will pay you to investigate the extra advantages to be gained by installing a CMP Unit designed, engineered and constructed under *one* responsibility by Western Precipitation Corporation—*leaders in both electrical and mechanical recovery fields!*

Combines Mechanical and Electrical Advantages:

A CMP (Combination Multiclone-Cottrell Precipitator) Unit combines—in one compact installation—both mechanical and electrical recovery principles, so that maximum benefit is obtained from the advantages inherent in each method. The MULTICLONE section centrifugally cleans the gases of the larger and heavier fly ash particles (down to a few microns in diameter) . . . and the COTTRELL Precipitator then electrically removes the very small particles remaining in the gases. This combination arrangement has important advantages:

1. Using the MULTICLONE for cleaning out the heavier particles permits the bulk of the recovery operation to be performed with relatively low-cost equipment.

2. Using the COTTRELL for final clean-up insures unusually high recovery efficiency—approaching theoretically perfect, if desired—with a high efficiency, compact Precipitator unit.

3. Each type of unit—MULTICLONE and COTTRELL—can be arranged for its most efficient application. MULTICLONES may be connected to each separate boiler, if desired, and their draft requirement cut out when the boiler is down . . . while a central COTTRELL handles all gases and operates at higher efficiencies, with continued low power cost, when one or more boilers are down.

4. During soot-blowing periods, or while warming up cold boilers, the MULTICLONE efficiency usually increases, preventing overloads of detrimental carbon from reaching the COTTRELL.

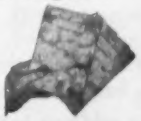
Only Western Precipitation Combines Multiclone and Cottrell "Know-How"—In ONE Organization!

A vital factor in obtaining maximum efficiency and economy in CMP installations is the proper balance of mechanical and electrical recovery equipment to the individual requirements of *each* application. Western Precipitation is unique in that it not only pioneered the commercial application of COTTRELL Electrical Precipitators over 43 years ago, but also has been a leader for many years in the *mechanical* recovery field with its widely-recognized MULTICLONE Collectors.

Result—Western Precipitation has the all-important "know-how" and experience in BOTH fields . . . knows from first-hand experience how to fit the *right* equipment in the *right* place, to do *your particular* job . . . and can provide the complete installation under ONE responsibility and ONE overall guarantee!

Let Our Experienced Engineers study your recovery requirements and make recommendations on the equipment best suited to your operations. A wire, phone call or letter to our nearest office places this unique "Know-How" at your service, without obligation!

Send for descriptive literature!



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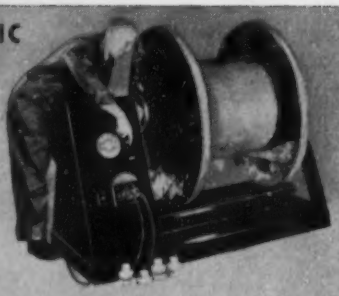
Model 30-60...
Handles the largest reels

Model A—REEL-O-MATIC
Motor Driven
Platform with foot
-and-finger controls



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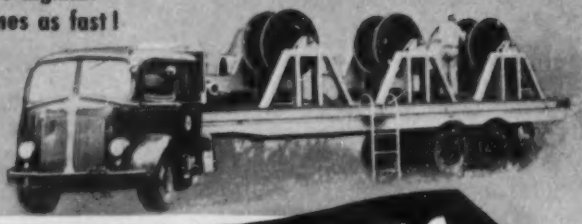
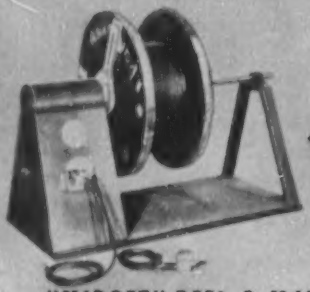
cuts costs by ⅔—
lays highline
3 times as fast!





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for "Reel" efficiency and economy

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...for handlers of...

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T-P UNIT
For Highline and Underground Cable Jobs

Write today

for Free Catalog describing the complete REEL-O-MATIC line of cable and wire rope handling equipment . . . ask for engineering advice on special problems.

A REEL-O-MATIC earns money for you by drastically reducing the costs of handling cable, wire rope, messenger strand, etc. In a matter of minutes, one man can measure, coil, and cut an order to specification . . . saving time, handling, and labor! REEL-O-MATIC does a *better* job faster.

In addition to the standard models shown, special REEL-O-MATICS are constantly being developed to suit specific needs . . . the REEL-O-MATIC principle has been successfully adapted to meet many unusual requirements of the U. S. Government, as well as private industry.

To ease your cable and wire handling problems, investigate REEL-O-MATIC . . . now!

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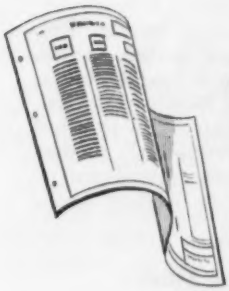
COLUMBIA 2, PENNA.

FREE- TO THOSE INTERESTED IN THE GENERATION AND DISTRIBUTION OF ELECTRICAL ENERGY



1.

GENERATION AND DISTRIBUTION OUTLINE . . . FOR SELF-ANALYSIS OF PROPER APPLICATION OF CO_2 BUILT-IN FIRE EXTINGUISHING SYSTEMS

Years of engineering built-in CO_2 fire extinguishing systems for the protection of generation and distribution installations have enabled Kidde to produce this outline – a comprehensive chart of a typical generation and distribution system. Drawn up in easy-to-read style, it shows where built-in CO_2 fire extinguishing systems are – and are not – applicable. With it, you can determine where a Kidde fully automatic CO_2 extinguishing system can be used to best advantage.

2.

"NEW PRESSURE OPERATED CO_2 FIRE EXTINGUISHING SYSTEMS – AUTOMATIC ELECTRIC TYPE"

Use this 11-page booklet in conjunction with Kidde's generation-distribution system chart. It describes fully Kidde's improved electrically-operated CO_2 fire extinguishing system – one which is particularly suited for the protection of transformers, generators, regulators and circuit breakers. The major changes recently made in this system make it the most modern and effective of its type on the market today.

Simply clip and mail the coupon on the right, and this fire protection material will be sent to you without cost or obligation.

Kidde

The words 'Kidde', 'Lux', 'Lux-O-Matic', 'Fyre-Frenz' and the Kidde seal are trademarks of Walter Kidde & Company, Inc.

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Walter Kidde & Company
of Canada, Ltd., Montreal-Toronto

TO: WALTER KIDDE & COMPANY, INC.
930 MAIN STREET, BELLEVILLE 9, N. J.

Gentlemen:

Please send me your generation-distribution system outline and booklet on the revised Kidde electrically operated CO_2 extinguishing system.

NAME_____

POSITION_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

ELECTRICAL WEST...

1 Current Trends

Western electric market potentials are assured —the 11 Western States will continue to perform well ahead of the rest of the U.S.

Expenditures by utilities for new electrical facilities in the West will be over $750,000,000 a year. Here's a sample of what this means for 1955:

KW of new capacity	2,216,950
Miles of transmission	5,510
Miles of distribution	7,800
Kva—substations	8,170,000

Add to this the millions of dollars worth of utilization equipment and the annual growth of the Western electrical market looms large indeed. This annual growth is the same as duplicating the entire Southern California Edison system and all the load-consuming devices on its lines!

2 Basic Statistics

There are 208 electric service systems in the 11 Western States. They have 18% of the country's generating capacity, but produce over 20% of the energy consumed. In 1954 they are building 23% of the country's new transmission lines, over 17% of primary distribution lines, and about 18% of the substations.

About 225 electrical wholesale houses supply 16% of the country's electrical contractors in the West. A growing electrical manufacturing industry provides locally made equipment to utilities, contractors, wholesalers and general industry.

More than 25% of the 1,075,000 non-farm housing units started in 1953 were in the 11 Western States. For 1954 and the next several years starts are expected to be within 10% of this figure.

3 What this Market Buys

Everything a utility needs to generate, transmit, distribute and sell electrical energy, plus design, construction and maintenance services—over $750,000,000 worth a year.

Every kind of electrical construction equipment needed in industrial, commercial and residential construction, including built-in devices such as lighting, electric heating, etc.

Power consuming equipment sold through electrical and appliance wholesalers—everything from motors to traffic appliances.

4 How this Market Buys

Utilities mostly buy direct from manufacturers who sell with their own sales forces or through representatives. In the West this latter practice has been most often the case, although as the Western market has grown more and more manufacturers are establishing their own plants and sales offices on the Coast.

Electrical construction material normally passes from manufacturers through electrical wholesale houses—then to contractors who buy and install equipment used in residential, commercial and most industrial construction.

In the West this distribution pattern sprawls over 40% of the land area of the U.S. Advertising and other printed sales material plays a most influential part in selling in the 11 Western States.

5 Available Market Data

ELECTRICAL WEST has available current "Buying Power Surveys," a Fingertip Data Booklet, and statistical summaries from the Annual Review and Forecast issue. We maintain a Directory of Western offices and Sales Representatives of electrical manufacturers, a Western "Where-to-Buy" product directory, a Directory of Electrical Manufacturers' Representatives, and a Directory of Western Appliance Service and Repair Parts.

6 Electrical West Serves the Market

ELECTRICAL WEST has served the electrical industry in the 11 Western States for 68 years. A McGraw-Hill publication, member of ABC and ABP. Circulation (6/30/54):

Utilities	6,096
Contractors	1,212
Wholesalers, Dealers	664
Consultants, Engineers	635
Manufacturers and others	1,825

ELECTRICAL WEST has twice as many utility subscribers in its area as does the leading national publication. It has one or more subscribers in more than 220 wholesale houses. Contractor circulation is concentrated among those employing 4 or more people.

Western electrical developments continuously provide ELECTRICAL WEST's top-flight editorial staff with outstanding technical articles. This means exclusive articles and "scoops" that assure high readership.

Independent readership surveys consistently show ELECTRICAL WEST equal to or ahead of national magazines in this area.

7 Electrical Advertisers Use Electrical West

Over 250 manufacturers of electrical equipment, apparatus and supplies ran a total of 1236 pages of advertising in ELECTRICAL WEST during 1953. They know that

"It's not hard to sell in the West—
But it's worth Selling hard."

ELECTRICAL WEST

A McGRAW-HILL PUBLICATION

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1111 WILSHIRE BLVD.....LOS ANGELES 17, CALIFORNIA
CARL DYSINGER

Public Relations

(*Continued on page* 117)

'Kilowatt Quiz' Brings Facts to Customers

"Kilowatt Quiz," the latest public relations tool prepared by the National Association of Electric Companies, is now available to member companies at a reasonable price.

The "Quiz" is a four-page folder, 3 by 5½ in. On the first page is a single question with multiple-choice answers. The correct answer is used as the headline on page 2. Copy on pages 2 and 3 explains and elaborates on the answer. Page 4 is blank to permit imprinting.

So far seven folders are available. Subjects covered include the federal government as a power supplier, taxes, the preference clause, and similar ones about which the public should be informed. Each folder tells a quick, succinct story.

The folders are designed to be mailed or enclosed with bills, pay checks, stockholders' reports, annual reports, or company correspondence. They are also useful as a method of informing editors, teachers, clergy, municipal officials, and civic leaders of the industry's viewpoint of controversial issues.

Companies may also use the folders to make a quick survey of the opinions and industry knowledge of their customers.

'You Are There' Show to Continue at 6:30 PM

"You Are There," the TV show sponsored on alternate weeks by the Electric Companies Advertising Program and the Prudential Insurance Co of America, will not be affected by the change in time.

Telecasts will continue every Sunday at 6:30 PM but at Eastern Standard instead of Daylight time. The program is carried by the CBS-TV network.

Coming programs include:

Oct. 3—"Sutter Discovers Gold."

Oct. 10—"The Great Adventure of Marco Polo."

Oct. 17—"Edison's Miracle of Light."

(*Scanning the Ads on page* 261)

IN THE FIELD as in laboratory tests . . . *Crapo* Galvanized Steel Strand proves itself capable of withstanding severe punishment. Steel's inherent strength and durability are combined with definite economies in every size and grade of *Crapo* Steel Strand. You'll find the heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Contact your jobber of *Crapo* Galvanized Products or write direct for further information!

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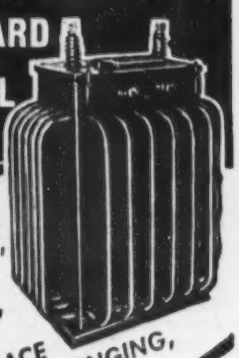
TRANSFORMERS
STANDARD • SPECIAL
AIR • OIL • WATER-COOLED



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SEND FOR NEW CATALOG NO. TR-50

⅙ TO 500 KVA • UP TO 15,000 V.

CHAS. EISLER
EISLER ENGINEERING CO., Inc.
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READ HOW THIS

Brush Eater

CUTS

DISPOSAL COSTS!

Send for New FREE Booklet

This booklet was written with one idea in mind—to show you how a Fitchburg Chipper can give you efficient, reliable, all-weather brush disposal at low cost.

Read how Fitchburg Chippers help leading tree surgeons, power companies, municipalities, utilities, etc. cut their disposal costs as much as 50%, and create added customer good will.

Send for your free, valuable Fitchburg Chipper booklet—packed with facts, specifications, suggestions. Mail the coupon at right, but do it now!

FITCHBURG ENGINEERING CORPORATION
Dept. 169, Fitchburg, Massachusetts
Send me the New Chipper Booklet!

Name_____

Address_____

City_____

State_____

MAIL THE COUPON TODAY!

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T. J. COPE, INC.

711 SOUTH 50TH STREET, PHILADELPHIA 43, PA.

Standard systems of trough and fittings for supporting power and control cable.
— For over 65 years, Manufacturers of Tools and Equipment for
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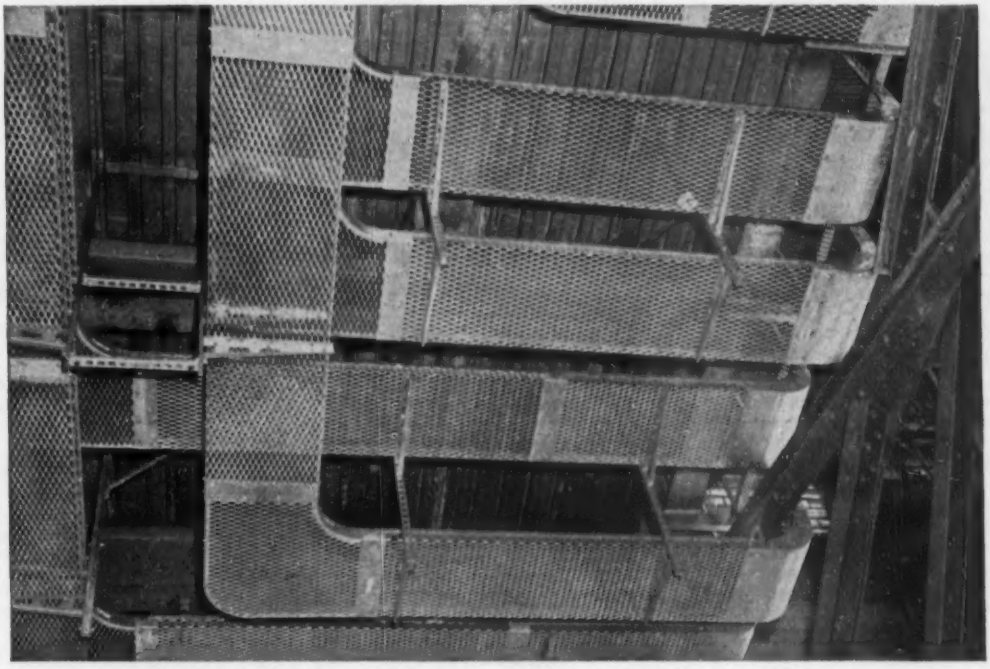

Cope Cable Trough installed at Ohio Edison Company, Niles Station. Hatzel & Buehler, Electrical Contractors.

The Cope Standardized Systems of Cable Trough is a simple, sturdy, time and labor saving construction for the support of electrical power and control cables. Hundreds of engineers and contractors have realized the advantages to be gained through the use of this trough in leading industrial plants and utility generating stations.

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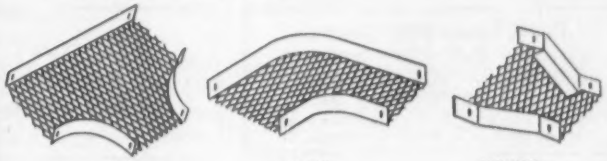

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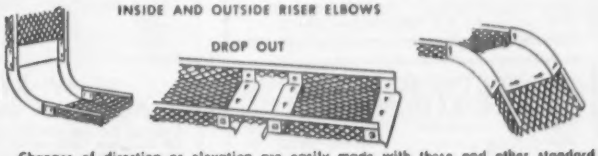
All fittings have radius corners to protect the cable from damage during installation and insure a neat finished job.

. . . in the Vertical Plane



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SCANNING THE ADS

Alabama Power Co—Inadequate wiring ad points out what happens when wiring is at fault. In the outside columns of a five-column ad are listed the effects of inadequate wiring on major appliances. Line drawings personify each appliance; e.g., the refrigerator is showing wiping its brow.

Carolina Power & Light Co—"Stop leading a double life!" is head on an ad advising people to "go completely electric." Ad is directed at getting people to quit using gas, but the word gas does not appear in the ad.

New England Gas & Electric System—"Live in a cave? You might as well if you don't have electric water heating."

Northern States Power Co—A series of ads is being run pointing out the cheapness of electricity. The series is made more effective by contrasting humorous drawings. One example: Man is shown trying to read book by the light of a match he is holding. Other man is showing reading by the light of a modern electric lamp. The copy under the former reads, "One penny buys two books of matches, or . . ." Under the latter, "One penny buys enough electricity to run a 100-watt light bulb over 3 hours."

Pennsylvania Power & Light Co—"Are those next 1,825 trips really necessary?" reads the head on an ad showing a woman going down cluttered cellar stairs. The ad points out that homemakers who must tend old-fashioned, non-automatic water heaters, make as many as 1,825 unnecessary trips to the cellar in a year and advises them to switch to electric water heating.

Philadelphia Electric Co—"When 'Blue Monday' lasted until Wednesday" was head on ad contrasting washing and ironing years ago with the same jobs handled by electric appliances.

Wisconsin Public Service Corp—"What a difference an air conditioner would make!" Illustration going with this head showed a man seated at his office desk. He has removed his trousers, is perspiring, waving a fan with his left hand, and holding a phone in his right.

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(Classified Advertising)

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Assistant Superintendent in a combined Mechanical and Electrical Department of a long established underground mining operation in East Tennessee.

Successful applicant should have had several years experience in maintenance, and preferably, but not necessarily, be a technical graduate in Electrical Engineering.

Climate and living conditions are excellent. Give details of work experience, and include at least three references as to character and ability. Salary open.

P-3305, Electrical World
330 W. 42 St., New York 36, N. Y.

WANTED

SALES AGENTS AND REPRESENTATIVES

having utility Co. following. Excellent remuneration. Openings in all States exclusive of Penna., Ohio, Indiana. Preservation of standing poles using Pentachlorophenol. All replies confidential.

POLE TREATING COMPANY
Box 707 Canton, Ohio

RATE MAN

YOUNG ENGINEERS

WANTED

We need a good electric rate man of experience, 35 to 40, as an addition to our consulting staff—also we need two young engineers—maybe 4 or 5 years out of school, to learn economic analysis and rate design.

We are an established firm of Engineering and Business Consultants, in business at this same location for more than a quarter century, serving clients all over the country. Send complete experience and photograph if available, with first letter.

MIDDLE WEST SERVICE COMPANY
20 North Wacker Drive
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SALES ENGINEER

Wanted—Sales-minded Electrical Engineer with utility experience. Field and headquarters sales and engineering activities. Travel required. Leading manufacturer of electrical insulators. Challenging opportunity for ambitious man. Electrical engineering degree desirable but will consider equivalent training or experience in transmission and distribution. Prefer under 35. Give complete details on training, experience record and late snap shot, if available in first letter. Salary open.

P-3925, Electrical World
330 W. 42 St., New York 36, N. Y.

INDUSTRIAL SALES AGENTS AND REPRESENTATIVES WANTED

Nationally known manufacturer expanding market new, exclusive types Industrial Flashlights and Batteries seeks Sales Agents calling on major Industrial Plants, Public Utilities, Shipyards, Airlines Companies, Railroads, Oil Refineries.

RW-3917, Electrical World
330 W. 42 St., New York 36, N. Y.

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This may be your opportunity to shine!

We are one of the industry's leading manufacturers of street and airport lighting equipment.

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If you are:

YOU will have had previous lighting equipment sales experience.

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If the above sounds like YOU, we'll arrange an interview at your convenience. Just drop a line, including a recent photo, if available, to

P-3977, Electrical World
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We are looking for a man between the ages of 33 and 38 who has had a college education in engineering, economics, or accounting and has had experience in electric, gas, water or telephone utilities—preferably in rates, engineering economics, business research, or finance.

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FS-3790, Electrical World
330 W. 42 St., New York 36, N. Y.

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SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

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LOAD DISPATCHER — Established growing utility in one of most desirable locations in Brazil desires temporary services (about one year) of experienced technician to initiate dispatching service and train local personnel in its operation and maintenance. System is combination thermal and hydro with transmission up to 132 KV. Excellent opportunity for active retired experienced chief load dispatcher. Reply giving education, experienced and personal particulars. P-3965, Electrical World.

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SALES ENGINEER

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RW-3976, Electrical World
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BO-3937, Electrical World
330 W. 42 St., New York 36, N. Y.

POSITIONS VACANT

DISTRIBUTION ENGINEER—Two competent experienced graduate Electrical Engineers, with approximately 10 years experience design, operation and maintenance of distribution facilities in established rapidly growing utility located South America. Reply giving resume education, experience and personal data. P-3963, Electrical World.

ELECTRICAL ENGINEER — Junior or Assistant Distribution Engineer — technical graduate with at least 3 years field experience operating utility Company. Permanent position with long established consulting organization New York. Some travel Latin American necessary in future. Knowledge of Spanish or Portuguese useful. Salary commensurate with experience. Reply stating age, education, experience and personal particulars. P-3966, Electrical World.

ELECTRICAL ENGINEER—Technical graduate—at least 5 years experience on electrical maintenance and operating problems of generating stations and substations of public utility companies. Permanent position with long established consulting organization New York. Some travel Latin America. Spanish or Portuguese useful. Salary commensurate with experience. Reply stating age, education, experience and personal particulars. P-3967, Electrical World.

WANTED—RECENTLY retired or about to be retired Power Company employees to engineer distribution jobs and material estimates. Location Middlewest, P-3755, Electrical World.

DISTRIBUTION ENGINEER—College graduate with at least ten years active experience in electric public utility distribution system design. Good starting salary. Address: P. O. Box #330, Hartford 15, Connecticut.

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3— 333 KVA G-E 33000-2300/4000Y
3— 333 KVA Mol 7200/12470Y-2500/4160Y
3— 333 KVA W-H 6600-2300
3— 150 KVA G-E 19050/33000Y-2540/4000Y
5— 150 KVA G-E 7200/12470Y-240/480
3— 100 KVA G-E 33000-6900/11950Y
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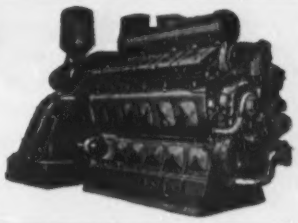

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1000	General Motors	16-567B	1440	720	300	General Motors	8-268A	450	1200
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700	Worthington	EE-8	1000	327	150	Worthington	CC-4	225	450
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500	Westg.	2300	137/275
500	Westg.	2300	275
400	A.C.	2300	120/240
300	G.E.	2300	250
200	G.E.	2300	250
200	Westg.	4160	250
200	Ridgeway	2300	250
170	G.E.	440	125
150	G.E.	2300	125/250
150	G.E.	4000	250
150	A.C.	2300	275
150	G.E.	440	275
100	Westg.	440	125
100	Elec. Mch.	440	125
100	G.E.	240	230
100	G.E.	440	125
90	G.E.	440	60
75	G.E.	440	125
60	Westg.	2300	125
60	A.C.	2300	125
50	Reliance	440	250
50	Ideal	2300	250
50	Westg.	240	125

WE'LL SELL, BUY OR TRADE
PHONE CANAL 6-2900

CHICAGO *Electric Co.*

1324 W. CERMAK ROAD
CHICAGO 8, ILL.

SUBSTATION EQUIPMENT

TRANSFORMERS

QU.	KVA	MFR.	VOLTAGE
1	10000	A. C.	66000—33000, 3 ph.
3	3125	Mol.	66000—2400
4	2500	Mol.	66000—13800
6	1250	Mol.	66000—2400
4	500	West.	69000—6900
3	400	G. E.	66000/33000—2300/4160
3	333	Stand.	69000/34500—7200/12470 Y
3	200	Pitts.	66000—2300
3	1500	Wag.	44000—6900
3	1250	A. C.	44000/11500—460
4	150	West.	44000/33000—2300/6900
3	75	West.	44000—7200/12470 Y
3	5000	G. E.	38100/66000—6600
1	3750	Penna.	38030/65865 Y—13800, 3 ph.
4	3333	G. E.	38100/66000 Y—33000
4	3125	Mol.	39900/66000 Y—26600/46000 Y
6	2000	Mol.	28100/66000 Y—13800
4	4500	G. E.	36000—13300—2400,
2	15000	West.	33000—2400/4160 Y, 3 ph.
1	5000	West.	34500—13750, 3 ph.
3	3333	G. E.	33000/11000—2400/7200
4	333	G. E.	34500—13800/23900 Y
3	200	A. C.	34500—2400/7200/12470 Y
3	75	Wag.	33000—240/480
3	1250	G. E.	26400/13200—2400
4	1500	A. C.	25400/44000 Y—6900/13800
3	100	G. E.	22000—7200/12470 Y
3	50	G. E.	22000—2300
1	600	Stand.	13200—2300, 3 ph.
1	650	Penna.	13200—2400, 3 ph. ASKAREL
3	333	G. E.	13200—2300
6	200	G. E.	13200—230/460
4	167	G. E.	7200/12470 Y—2400
3	125	A. C.	6900—2300
3	371	G. E.	6900—230/460
4	150	G. E.	4800/2400—240/120
2	100	G. E.	4800/2400—240/480
1	3000	G. E.	4160—480/277 PYRANOL
3	333	G. E.	2400/4160 Y—460
3	250	G. E.	2300/4000 Y—115/230
3	200	West.	2400—240/480
3	167	G. E.	2400/4160 Y—240 x 480
3	150	West.	2400—230/115
1	100	G. E.	2300—575, 3 ph.
6	50	West.	2400—114/228 DRY TYPE

ALSO— FREQUENCY CHANGERS
MOTOR GENERATOR SETS
SYNCH. CONDENSERS
OIL CIRCUIT BREAKERS
FEEDER REGULATORS, etc.

BREW, WOLTMAN & CO., INC.
52 Church St. New York 7, N. Y.

RE-NU-BUILT
GUARANTEED

ELECTRIC POWER EQUIPMENT

MOTOR GENERATOR SETS

3 ph., 60 cy.

Qu.	KW	Make	Speed	DC Volts	DC Volts
1	3000 3U	G.E.	514	600	4000/13200
2	2000/2400	G.E.	450	250/300	2300/4600
2	2000	G.E.	514	600	6600/13200
1	2000	G.E.	500	666 2S cy.	11000
2	2000	G.E.	450	600	2300/4600
1	1500	C.W.	514	115	4000/13800
1	1500	G.E.	720	600	13200
1	1000	G.E.	900	260	4100/6900
3	1000	G.E.	720	600	2300/4600
2	750	G.E.	720	275	2300/4600
1	500	Whse.	1200	125/250	2300
1	500	Whse.	900	250	440
1	500	G.E.	720	125	2300

TURBO GENERATORS

Qu.	KW	Make	Desc.
1	4000	G.E.	Condensing—425 lbs—750# F.T.T.—Surface Condenser 3/60/2300-4000 v with exciter
1	1000	G.E.	Non-Cond—190 lbs-2400-3-60
1	1000	Moore	Condensing—Extraction—190 lbs., 2400-3-60—Surface Cond.
1	750	G.E.	Condensing—265 lbs., 440-3-60 Built 1944
1	600	Moore	Non-Cond—150/200 lbs., 5/35 lbs. B.P., 480-3-60 Dir. Conn Exciter.
1	300	G.E.	Non-Cond—150/175 lbs., 5/10 lbs. B. P., 480-3-60

FREQUENCY CHANGERS

Qu.	Kva	Make	Cycles	Voltages
1	13900	Whse.	60/25	13200 x 13200
1	3750	G.E.	60/25	4150/2400 x 2400/4150
1	3125	G.E.	25/60	4150/2400 x 2400/4150
2	2500	G.E.	25/62½	2300 x 4160
1	1250	G.E.	25/58.3	4400 x 2300
1	625	A.C.	25/60	11000 x 2300

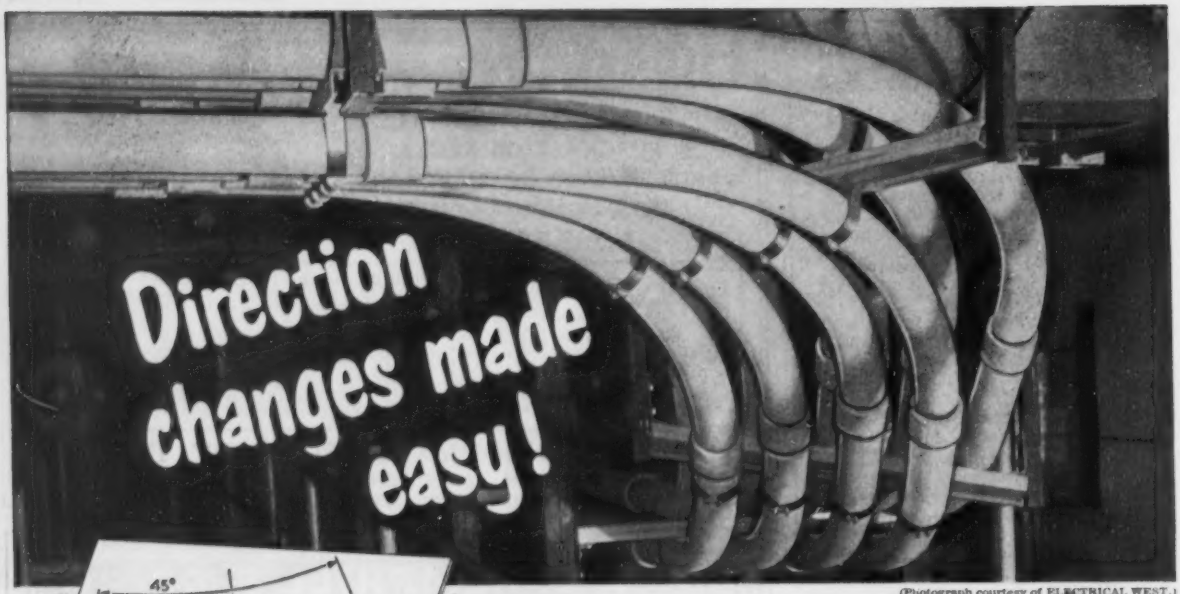
TRANSFORMERS—60 Cycle

KVA	Make	Type	Ph	Voltages
1	5000	Whse.	OISC	3	23000x26400/13200
1	2500	Whse.	OISC	3	26400/13200 x 450
3	2000	G.E.	HVDDJ	1	66000 x 13800
3	667	G.E.	HD	1	13800 x 2300
3	1250	G.E.	HVDDJ		6600/550
3	1000	G.E.	HVDDJ	1	2200/480

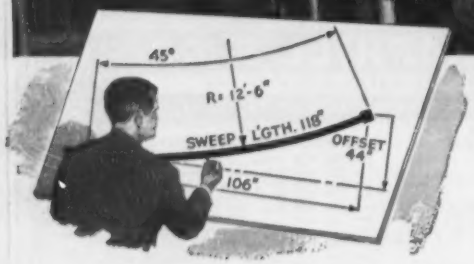
BELYEA COMPANY, INC.
51 Howell Street, Jersey City 6, N. Y.

250 HP, GE open motor, enclosed slip rings, 300 RPM, stub shaft, 2200 volt.
240 HP ,GE Synchronous motor, direct connected exciter, 600 RPM, 2200 volt.
2—150 KVA, GE Transformers, Type H, Form KD, 11500—230/460 volts, 5 & 10% Taps.

ZIMMERMAN ELECTRIC MACHINERY CO.
1815 E. Central Wichita, Kansas



(Photograph courtesy of ELECTRICAL WEST.)

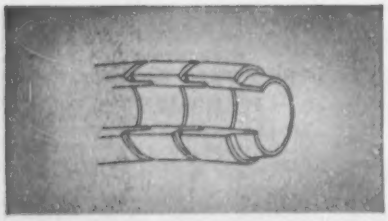


. . . with standard fittings for TRANSITE asbestos-cement DUCTS

When you use Transite Ducts, you have available a wide variety of standard fittings, made of the same asbestos-cement material as the ducts themselves. These fittings save time and expense because they provide maximum flexibility in laying out or constructing a duct system. They facilitate clearing unexpected obstructions or accommodating revisions in the original layout.

For instance, the new Transite 5° Bend Segments (shown at left) can be used alone to form simple and complex curvatures of any multiple of 5°. Used with other standard Transite curved fittings, they form curvatures of odd degrees. Thus, they enable you to simplify cross-overs and transformations . . . to clear obstructions . . . to form unusual or special bend or offset sections. They eliminate the need for purchasing special radii bends or sweeps. The other standard Transite fittings that facilitate directional changes are the offset bends, standard 45° and 90° bends, sweeps, curved segments, laterals, tees, elbows and deflection couplings.

For complete information write for new brochure EL-45-A, "Fittings and Dimensions of Transite Ducts." Contains all dimensional data required by the designer. Also available, "Transite Duct Underground Installation Sheet," EL-43-A. Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay St., Toronto, Ontario.



5° bend segment sketched in detail. It consists of a straight section of Transite stock with a male taper on one end and a female taper on the other . . . each machined at an angle of 2½° to the center axis. Segments can thus be used single, or combined to form bend sections whose curvature is any multiple of 5°.

Photograph showing use of bend segments and curved segments with Transite Ducts.

5 OTHER REASONS WHY TRANSITE DUCTS DO A BETTER JOB AT LESS COST:

1. **Corrosion-Resistant.** Transite, being made of inorganic asbestos and cement, resists corrosion and is immune to electrolysis.
2. **Permanently Smooth Bore.** Transite makes long cable pulls easy, under any conditions. Danger of damage to cables is also minimized.
3. **Incombustible.** Transite will not burn or contribute to formation of smoke, gases, fumes. It confines burnouts, will not soften under heat.
4. **Higher Thermal Conductivity.** Cables run cooler in Transite, reducing I^2R losses, increasing current capacity and prolonging insulation life.
5. **Easy to Install.** Transite Ducts are light weight, easy to handle. Joints are quickly made. Long 10-foot lengths reduce number of joints in line.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE® DUCTS

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

VAULT BEFORE

VAULT AFTER

Cuts space needs in half!

New Vault-Type Power Unit Ideal for Shopping Centers

ALLIS-CHALMERS NEW vault-type power unit provides three or four standard distribution transformer core and coil assemblies plus metering transformers in a single, submersible-type tank. The units are so compact that a complete vault-type power unit takes only half the space of a bank of three single-phase distribution transformers.

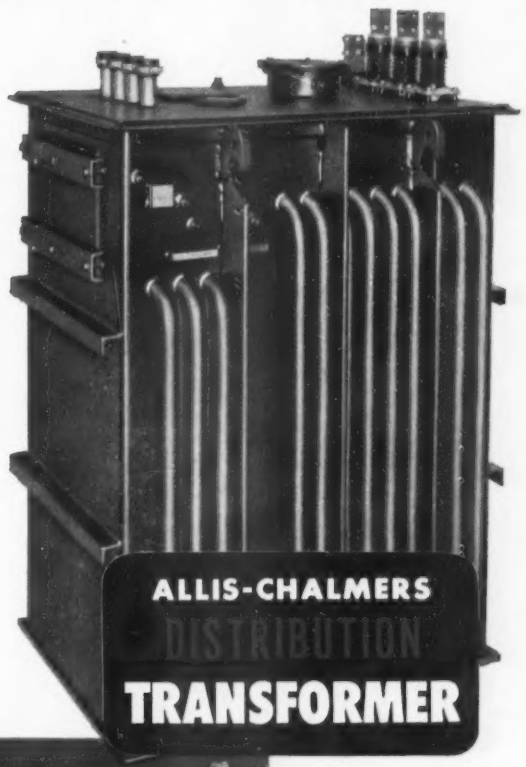
The new unit can be designed to supply three-phase power or three-phase power and single-phase lighting loads. It is the ideal answer to the space problem in areas like schools, hospitals, large apartment houses or where increased use of air conditioning or other large appliances is causing loads to grow fast.

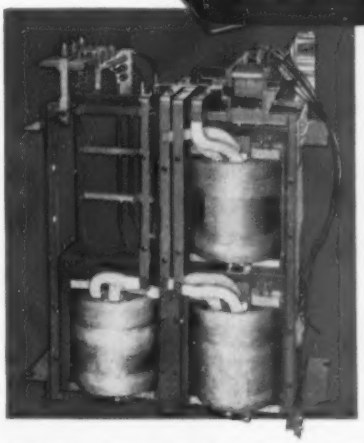
Simplified Installation

Allis-Chalmers vault-type power units can be installed either underground or in buildings. Core and coil assemblies are internally connected at the factory and leads are terminated at the cover. This reduces installation time and expense by eliminating primary and secondary bus work.

Get complete information on the space-saving advantages of Allis-Chalmers new vault-type power units. Consult the A-C office nearest you or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4426

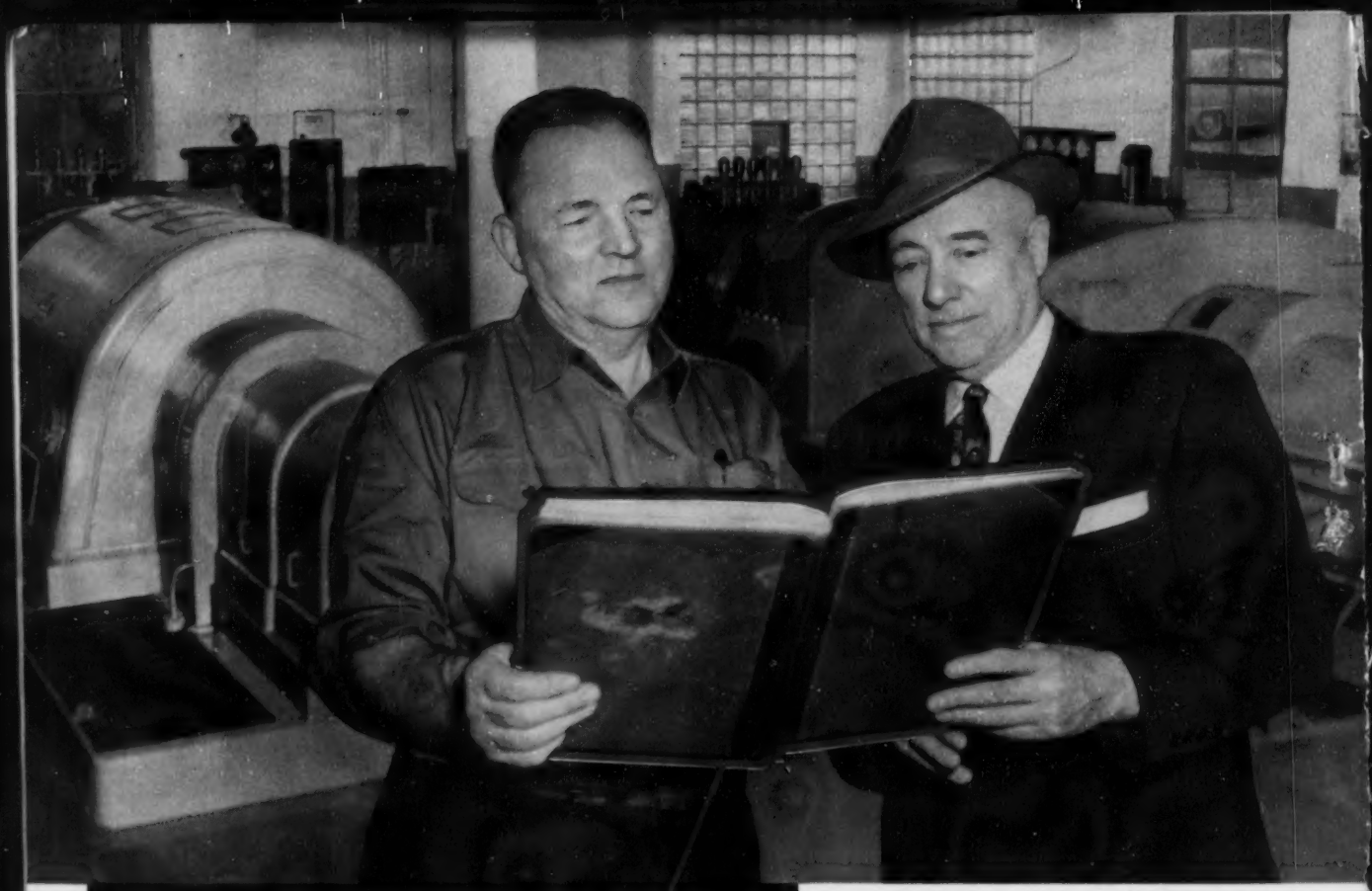


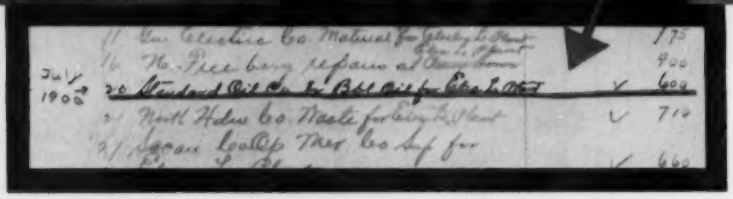


TEMPORARY CLAMPS seal HV access panel until installation. After final system connections are made, panel is welded into position. All other covers are weld-sealed. Special paint and compound protect case. Space is provided for an additional core and coil assembly to change a three-phase unit into a combination single-/three-phase unit.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS





July 1900
20 Standard Oil Co. to Bill Oil for Eleven Half
21 North Hebo Co. Waste for boiler room
21 Logan Coal Co. Mer. Co. Coal for

Engineer Carl Barr and O. P. Sather, Standard Oil Chief Lubrication Engineer, are inspecting the old log book showing the first purchase from Standard Oil was made way back in 1900.

"Our records show Standard's been putting in at Two Harbors for 54 years!"

■ The operating log in the power plant of the city of Two Harbors, Minnesota, shows that on July 20, 1900, a half barrel of engine oil for use on a steam engine was the first purchase made from the Standard Oil Company. Since then, page after page of the log shows Standard has been filling all of this power plant's lubrication requirements.

Carl Barr, chief engineer for thirty years, says: "When we bought our first turbine in 1937, we knew that NONPAREIL Turbine Oil was what we wanted. NONPAREIL's performance proved that we were right. Since 1937 we've added and replaced turbines and always installed NONPAREIL. We've never had any trouble with governors. There's been no foaming or rusting . . . no deposits in the oil coolers. In fact, with NONPAREIL on the job we've had no malfunctions of any kind!"

For guaranteed lubrication in *your* turbines—new or old—fill with NONPAREIL Turbine Oil. With each fill of NONPAREIL goes a written guarantee stating that the oil will last as long as the turbine and will maintain a neutralization number below 0.15 mg. KOH/gm. Call the Standard Oil lubrication specialist near you or write: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

NONPAREIL
TRADE MARK
Turbine Oil

STANDARD OIL COMPANY

STANDARD (*Indiana*)